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# Installation, Operating and Service Instructions with Parts List

## **Culligan Gold Series™ Water Softener Models From 2005**

The Culligan logo is written in a stylized, cursive script. The word "Culligan" is in a dark, textured font, and a registered trademark symbol (®) is located at the end of the word.

***Attention Culligan Customer:***

The installation, service and maintenance of this equipment should be rendered by a qualified and trained service technician. Your local independently operated Culligan dealer employs trained service and maintenance personnel who are experienced in the installation, function and repair of Culligan equipment. This publication is written specifically for these individuals and is intended for their use.

We encourage Culligan users to learn about Culligan products, but we believe that product knowledge is best obtained by consulting with your Culligan dealer. Untrained individuals who use this manual assume the risk of any resulting property damage or personal injury.



**WARNING - Prior to servicing equipment, disconnect power supply to prevent electrical shock.**



**WARNING - If incorrectly installed, operated or maintained, this product can cause severe injury. Those who install, operate, or maintain this product should be trained in its proper use, warned of its dangers, and should read the entire manual before attempting to install, operate or maintain this product.**

**THIS SYSTEM IS NOT INTENDED TO BE USED FOR TREATING WATER THAT IS MICROBIOLOGICALLY UNSAFE OR OF UNKNOWN QUALITY WITHOUT ADEQUATE DISINFECTION BEFORE OR AFTER THE SYSTEM.**

**CULLIGAN INTERNATIONAL COMPANY**

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# Installation, Operating and Service Instructions with Parts List

## Culligan Gold Series™ Water Softener Models From 2005



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# Introduction

## Read this Manual First

Before you operate the Culligan Gold Series™ Water Softening System, read this manual to become familiar with the device and its capabilities.

## Watch for Special Paragraphs

Please read the special paragraphs in this manual. Examples are shown below.

The Culligan Gold Series™ Water Softeners are tested and certified by WQA against NSF/ANSI Standard 44 for the effective reduction of hardness (calcium and magnesium) as tested and substantiated by test data.



***For installations in Massachusetts, the Commonwealth of Massachusetts Plumbing Code 248 CMR shall be adhered to. Consult your licensed plumber for installation of the system. This system and its installation must comply with state and local regulations.***

## Safe Practices

Throughout this manual there are paragraphs set off by special headings.

**NOTE:** Check and comply with your state and local codes. You must follow these guidelines.

**NOTE:** Notice is used to emphasize installation, operation or maintenance information which is important, but does not present any hazard. Example:

**NOTE:** The nipple must extend no more than 1 inch above the cover plate.

**CAUTION:** Caution is used when failure to follow directions could result in damage to equipment or property. Example:



**CAUTION!** Disassembly while under water pressure can result in flooding.

**WARNING:** Warning is used to indicate a hazard which could cause injury or death if ignored. Example:



**WARNING!** Electrical shock hazard! Unplug the unit before removing the cover or accessing any internal control parts.

## Serial Numbers

The control valve serial number is located on the back of the timer case.

The media tank serial number is located on the top surface of the tank.

This publication is based on information available when approved for printing. Continuing design refinement could cause changes that may not be included in this publication.

**NOTE:** Do not remove or destroy the serial number. It must be referenced on request for warranty repair or replacement.

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# Performance Specifications

Control Valve	9" Model • 1" 5-cycle Reinforced Thermoplastic	10" Model • 1" 5-cycle Reinforced Thermoplastic	12" Model • 1" 5-cycle Reinforced Thermoplastic	14" Model • 1" 5-cycle Reinforced Thermoplastic
Overall Conditioner Height	54 in	60 in	58 in	71 in
Media Tank Design	Quadra-Hull™	Quadra-Hull™	Quadra-Hull™	Quadra-Hull™
Media Tank Dimensions (Dia x Ht)	9 x 48 in	10 x 54 in	12 x 52 in	14 x 65 in
Salt Storage Tank Dimensions (Dia x Ht)	16 x 43 in or 18 x 43 in	18 x 43 in	18 x 43 in	24 x 42 in
Exchange Media, Type and Quantity	Cullex® Media, 1.0 ft³	Cullex® Media, 1.5 ft³	Cullex® Media, 2.0 ft³	Cullex® Media, 3.0 ft³
Underbedding, Type and Quantity	Cullsans® Underbedding, 12 lb	Cullsans® Underbedding, 15 lb	Cullsans® Underbedding, 20 lb	Cullsans® Underbedding, 25 lb
Exchange Capacity @ Salt Dosage Per Recharge	19,500 gr @ 4.0 lb 28,600 gr @ 8.0 lb 33,200 gr @ 12.0 lb	28,900 gr @ 6.0 lb 38,900 gr @ 12.0 lb 46,800 gr @ 18.0 lb	32,600 gr @ 7.0 lb 61,600 gr @ 18.0 lb 71,700 gr @ 30.0 lb	52,200 gr @ 12.0 lb 76,500 gr @ 24.0 lb 92,600 gr @ 36.0 lb
Efficiency rated dosage¹	4,890 gr/lb @ 4 lb salt dosage	4,800 gr/lb @ 6 lb salt dosage	4,60 gr/lb @ 7 lb salt dosage	4,350 gr/lb @ 12 lb salt dosage
Freeboard to Media²	14.5 in	14.5 in	16 in	25 in
Freeboard to Underbedding³	44.5 in	47.5 in	46 in	59 in
Salt Storage Capacity	250 lb or 375 lb	375 lb	375 lb	600 lb
Rated Service Flow @ Pressure Drop	9.0 gpm @ 13 psi	9.6 gpm @ 15 psi	10.0 gpm @ 15 psi	10.8 gpm @ 15 psi
Total Hardness, Maximum	75 gpg	99 gpg	99 gpg	99 gpg
Total Iron, Maximum	5 ppm	5 ppm	5 ppm	5 ppm
Hardness to Iron Ratio, Minimum	8 gpg to 1 ppm	8 gpg to 1 ppm	8 gpg to 1 ppm	8 gpg to 1 ppm
Operating Pressure	20-125 psi	20-125 psi	20-125 psi	20-125 psi
Operating Pressure (Canada)	20-90 psi	20-90 psi	20-90 psi	20-90 psi
Operating Temperature	33-120°F	33-120°F	33-120°F	33-120°F
Electrical Requirements	24V/60 Hz	24V/60 Hz	24V/60 Hz	24V/60 Hz
Electrical Power Consumption, Min/Max	3 Watts/35 Watts	3 Watts/35 Watts	3 Watts/35 Watts	3 Watts/35 Watts
Drain Flow, Maximum⁴	1.6 gpm	1.6 gpm	2.6 gpm	6.6 gpm
Recharge Time, Average⁵	68 min	57 min	52 min	55 min
Recharge Water Consumption, Average⁵	35 gal	46 gal	51 gal	176 gal

1 The efficiency rated dosage is only valid at the stated salt dosage and is efficiency rated according to NSF/ANSI 44.

2 Measured from top of media to top surface of tank threads. (backwashed and drained).

3 Measured from top of underbedding to top surface of tank threads.

4 Backwash at 120 psi (830 kPa).

5 10 minute backwash, 4 lb 9" model, 6 lb. 10" model, 7 lb. 12" model or 12 lb. 14" model salt dosage.

# Preparation

## Component Description

The water conditioner is shipped from the factory in a minimum of four cartons. Remove all components from their cartons and inspect them before starting installation.

**Control Valve Assembly** - Includes the 5-cycle regeneration control valve and the Accusoft® Plus Microprocessor. Small parts packages will contain additional installation hardware, and the conditioner Owner's Guide.

**Media Tank** - Includes Quadra-Hull™ media tank complete with Cullex® ion exchange resin, underbedding and outlet manifold (12" and 14" tanks are shipped without media).

**Salt Storage Tank Assembly** - Includes salt storage container with support plate and Dubl-Safe™ brine refill valve and chamber.

**Bypass Valve** - Includes the molded bypass valve, the interconnecting couplings, and the assembly pins.

## Tools and Materials

The following tools and supplies will be needed, depending on installation method. Observe all applicable codes.

**NOTE:** Check and comply with your state and local codes. You must follow these guidelines.

**For installations in Massachusetts, the Commonwealth of Massachusetts Plumbing Code 248 CMR shall be adhered to. Consult your licensed plumber for installation of the system. This system and its installation must comply with state and local regulations.**

## All Installations

- Safety glasses
- Phillips screwdrivers, small and medium tip.
- Gauge assembly (PN 00-3044-50 or equivalent)
- Silicone lubricant (PN 00-4715-07 or equivalent) - DO NOT USE PETROLEUM-BASED LUBRICANTS
- A bucket, preferably light-colored
- Towels

## Special Tools

- Torch, solder and flux for sweat copper connections
- Use only lead-free solder and flux for all sweat-solder connections, as required by state and local codes.
- Threading tools, pipe wrenches and thread sealer for threaded connections.
- Saw, solvent and cement for plastic pipe connections.

## Materials

- Brine line, 5/16" (PN 00-3031-28 or equivalent) or 1/2" (PN 00-9018-00 or equivalent)
- Drain line, 1/2" (PN 00-3030-82, gray, semi-flexible; or PN 00-3319-46, black, semi-rigid; or equivalent)
- Thread sealing tape
- Pressure reducing valve (if pressure exceeds 125 psi [860 kPa], PN 00-4909-00 or equivalent)
- Pipe and fittings suited to the type of installation
- Water softener salt (rock, solar or pellet salt formulated specifically for water softeners)

## Application

**Water quality** - Verify that raw water hardness and iron are within limits. Note the hardness for setting the salt dosage and recharge frequency.

Iron is a common water problem. The chemical/physical nature of iron found in natural water supplies is exhibited in four general types:

1. **Dissolved Iron** - Also called ferrous or "clear water" iron. Up to 5 ppm of this type of iron can be removed from the water by the same ion exchange principle that removes the hardness elements, calcium and magnesium. Dissolved iron is soluble in water and is detected by taking a sample of the water to be treated in a clear glass. The water in the glass is initially clear, but on standing exposed to the air, it may gradually turn cloudy or colored as it oxidizes.
2. **Particulate Iron** - Also called ferric or colloidal iron. This type of iron is an undissolved particle of iron. A softener will remove larger particles, but they may not be washed out in regeneration effectively and will eventually foul the ion exchange resin. A filtering treatment will be required to remove this type of iron.

3. **Organic Bound Iron** - This type of iron is strongly attached to an organic compound in the water. The ion exchange process alone cannot break this attachment and the softener will not remove this type of iron.
4. **Bacterial Iron** - This type of iron is protected inside a bacteria cell. Like the organic bound iron, it is not removed by a water softener.

When using a softener to remove both hardness and up to 5 ppm of dissolved iron it is important that it regenerates more frequently than ordinarily would be calculated for hardness removal alone. Although many factors and formulas have been used to determine this frequency, it is recommended that the softener be regenerated when it has reached 50 - 75% of the calculated hardness alone capacity. This will minimize the potential for bed fouling (iron removal claims have not been verified by the Water Quality Association or Underwriters Laboratories).

If you are operating a water softener on clear water iron, regular resin bed cleaning is needed to keep the bed from coating with iron. Even when operating a softener on water with less than the maximum of dissolved iron, regular cleanings should be performed. Clean every six months or more often if iron appears in your conditioned water supply. Use resin bed cleaning compounds carefully following the directions on the container. Hardness sample kits are available through your local Culligan dealer.



**CAUTION:** Do not use where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit.

**Pressure** - If pressure exceeds 125 psi (860 kPa), install a pressure reducing valve (see materials checklist). On private water systems, make sure the minimum pressure (the pressure at which the pump starts) is greater than 20 psi (140 kPa). Adjust the pressure switch if necessary.



**CAUTION:** The use of a pressure reducing valve may limit the flow of water in the household.

**Temperature** - Do not install the unit where it might freeze, or next to a water heater or furnace or in direct sunlight. Outdoor installation is not recommended and voids the warranty. Use the Culligan Outdoor Gold Series softener for outdoor installations. The Culligan Outdoor Gold Series softener has been certified by Underwriter's Laboratories for outdoor installation. If installing in an outside location, you must take the steps necessary to assure the softener, installation plumbing, wiring, etc. are as well protected from the elements (sunlight, rain, wind, heat, cold), contamination, vandalism, etc. as when installed indoors.

## Location

**Space requirements** - Allow 6-12 inches (15-30 cm) behind the unit for plumbing and drain lines and 4 feet (1.3 meters) above for service access and filling the salt container.

**Floor surface** - Choose an area with solid, level floor free of bumps or irregularities. Bumps, cracks, stones and other irregularities can cause the salt storage tank bottom to crack when filled with salt and water.

**Drain facilities** - Choose a nearby drain that can handle the rated drain flow (floor drain, sink or stand pipe). Refer to the Drain Line Chart, Table 3 (page 21), for maximum drain line length.

**NOTE:** Most codes require an anti-siphon device or airgap. Observe all local plumbing codes and drain restrictions. The system and installation must comply with all state and local laws and regulations.

**Electrical facilities** - A 10-foot cord and wall mount plug-in transformer are provided. The customer should provide a receptacle, preferably one not controlled by a switch that can be turned off accidentally. Observe local electrical codes.

**NOTE:** P.N. 01012956 and P.N. 01014897 plug-in transformer are rated for indoor installations only.

P.N. 01015972 plug-in transformer is rated for indoor/outdoor installations. (Non-Aqua-Sensor®)

**NOTE:** The softener works on 24 volt - 60 Hz power only. Be sure to use the included transformer. Be sure the electrical outlet and transformer are in an inside location to protect from moisture. Properly ground to conform with all governing codes and ordinances.

# Basic Principles

## Terms

**Brine** - A solution of water and salt used to regenerate the resin.

**Distributor** - A pipe with slits that allows the water to enter and leave inside the media tank.

**Media** - The underbedding and resin the media tank holds.

**Regenerate** - A process where the resin once exhausted of its softening capabilities is revitalized to soften again.

**Resin** - The actual material that softens hard water, shaped like little beads.

**Underbedding** - A gravel mixture that keeps the resin from entering the distributors.

### Brine Tank

Refer to section "Filling the Salt Storage Container", page 21 for proper Brine Tank usage.

### Media Tank

The letters underneath the component's description refer to the values listed on Appendix A, Table 2 - Media Volumes and Freeboard.

Figure 1

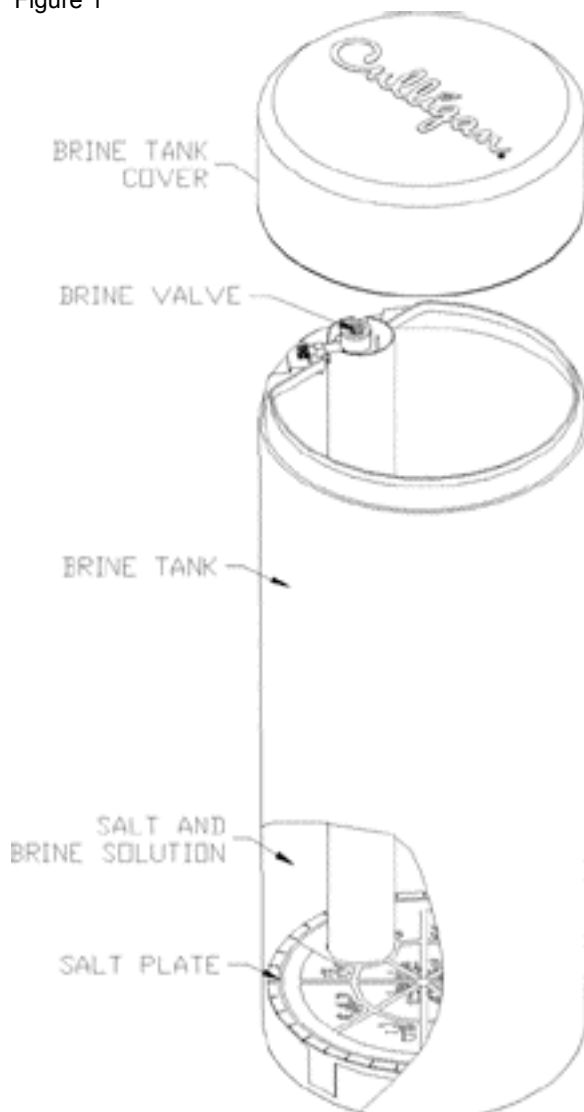
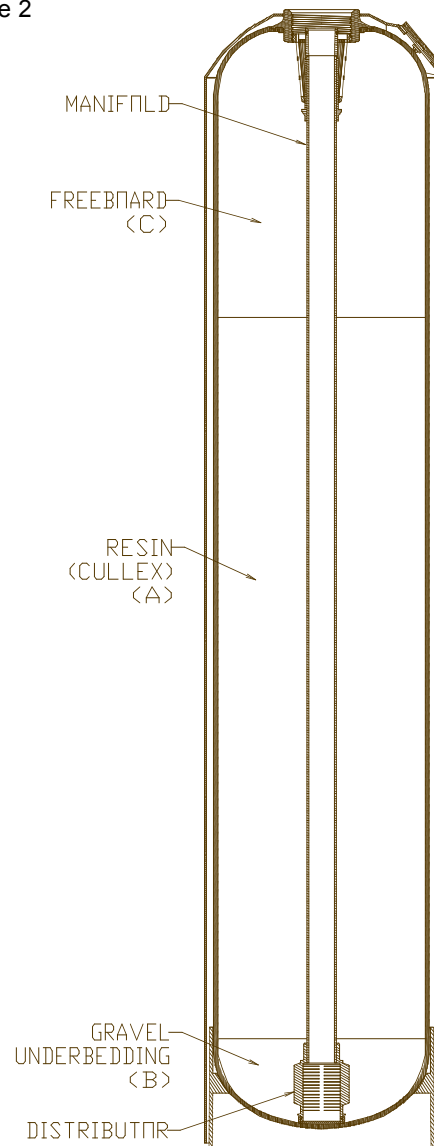


Figure 2





### **What is Hard Water?**

Water is said to be hard when it carries too high a concentration of calcium and magnesium. Acceptable water hardness levels will vary depending on the application.

### **How Does it Work?**

The components of dissolved minerals are called ions. They carry either a positive or negative charge. Hardness ions of minerals dissolved in water carry a positive charge. These positively charged ions (cations) are attracted to a synthetic softening material called ion exchange resin.

The heart of the softening system, therefore, is a deep bed of resin which draws calcium and magnesium ions, as well as ferrous iron, from the water as it passes through the resin bed.

### **Can the Resin Draw Out Hardness Ions Indefinitely?**

No. During normal operation, the resin becomes saturated with positive ions and functions less efficiently. When hardness leakage occurs, the resin should be regenerated to restore its efficiency.

### **How Do You Regenerate Resin?**

You regenerate a resin bed by removing the mineral ions through a process called "ion exchange". This regeneration process occurs in four steps and takes approximately 50 to 70 minutes. Each of the following steps are graphically depicted on pages 8 - 12.

1. **Backwash** - During the backwash step, raw water flows rapidly upward (in reverse direction to the service flow) through the resin bed to expand the bed and flush out accumulated dirt, sediment and other sources of turbidity.
2. **Brine Draw** - The brine solution consisting of water and salt is drawn from a brine storage tank and allowed to flow slowly down through the resin bed. The brine solution removes the calcium and magnesium ions from the resin.
3. **Slow Rinse** - Brine draw is then followed by a raw water slow rinse. This rinse step will slowly remove most of the remaining brine, exchanged calcium and magnesium ions from the resin.
4. **Fast Rinse** - Slow rinse is followed by a raw water flush, a very rapid down flow of raw water which removes the last traces of brine, and settles the resin bed.

### **How Often Must You Regenerate?**

Frequency must be determined for each installation based on the amount of water usage, its degree of hardness and the amount of resin through which it flows. In some cases it is necessary to utilize a resin cleaner when the raw water contains iron. Contact your local Culligan dealer for more information.

### **How Do You Control the Regeneration Process?**

The regeneration process for the water softener is controlled automatically either on a predetermined time, volume, or external signal basis through the use of the Culligan Accusoft Plus controller with optional Aqua-Sensor® or flow sensor. The regeneration process can also be initiated manually by the operator as required.

## Flow Diagrams

### Service

Refer to Figure 3

Raw water is allowed in the inlet to the top of the tank. The water is run through the resin up the manifold to the outlet. The water to the outlet should be soft if the system is operating properly.

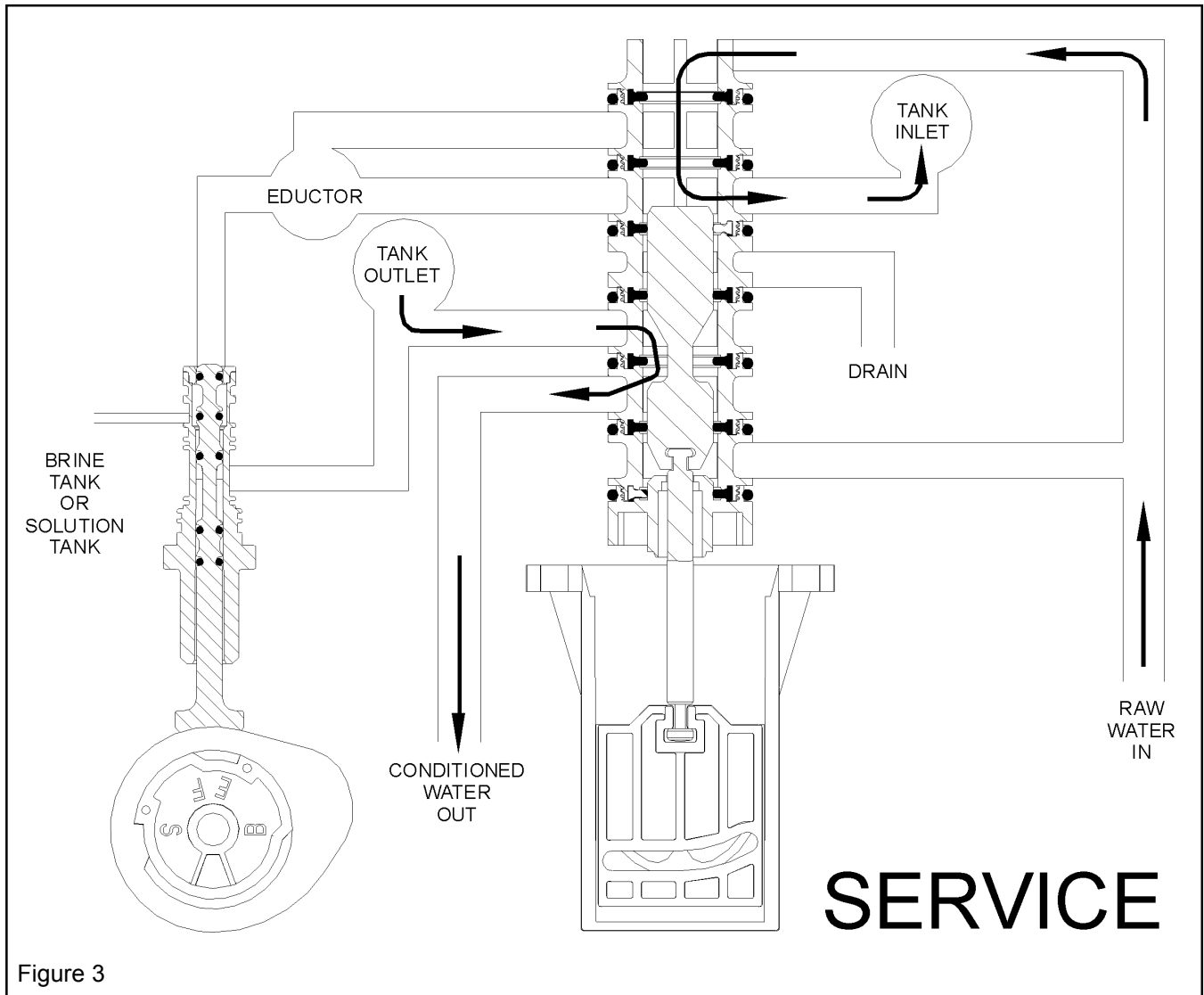


Figure 3

## Backwash

Refer to Fig. 4

Raw water is directed down the center of the manifold, up through the resin, out the top of the tank to drain. The water to drain should be hard.

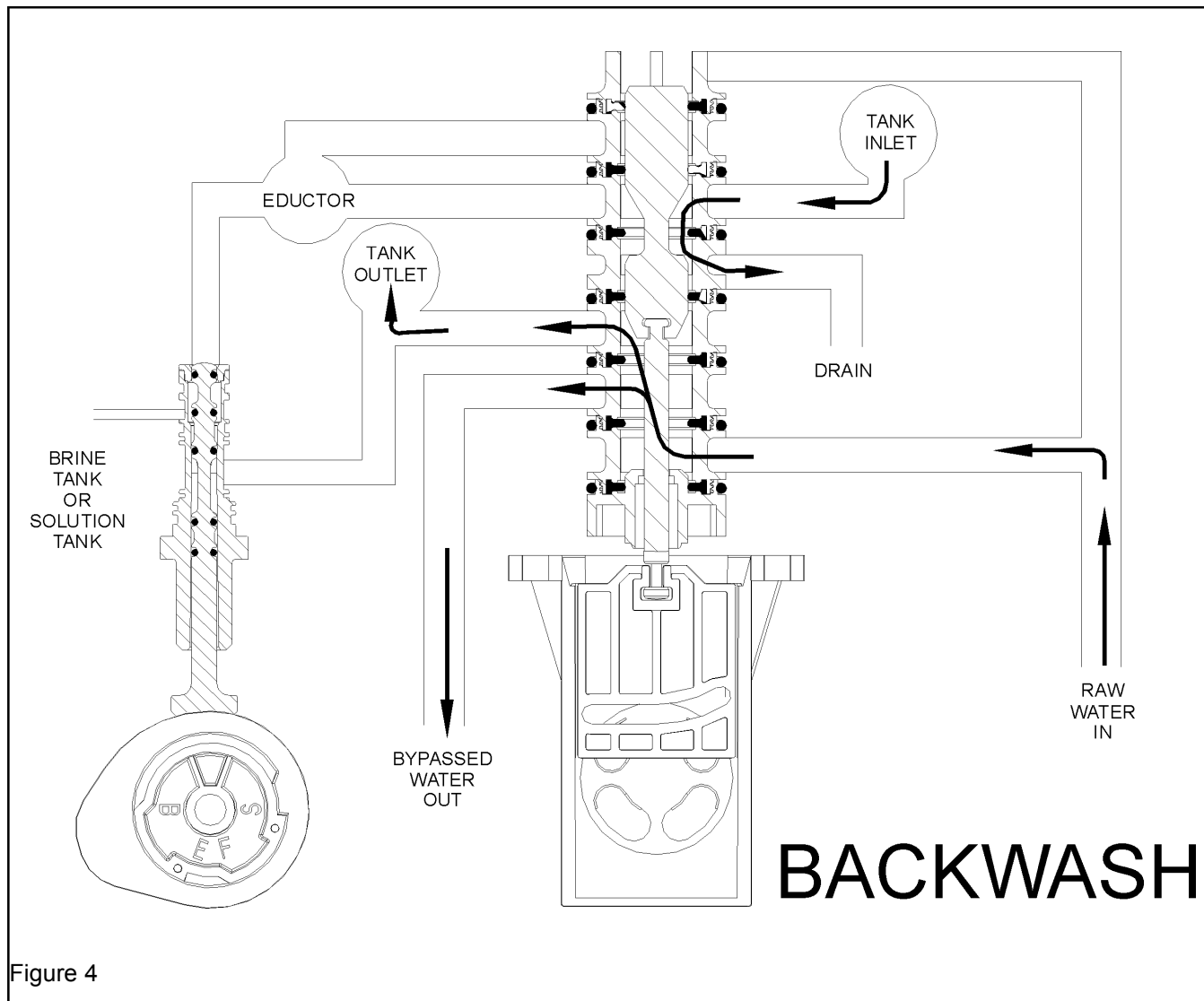


Figure 4

## Regenerant Draw

Refer to Fig. 5

Raw water is directed from the inlet through the nozzle and into the throat. A vacuum is created and concentrated brine is educted (drawn). The raw water and concentrated brine combine, enter the mineral tank, and pass through the resin, up the manifold and to the drain. Once all of the brine has been educted and the brine valve seats, the unit goes into slow rinse. Hard water is allowed to service during regeneration.

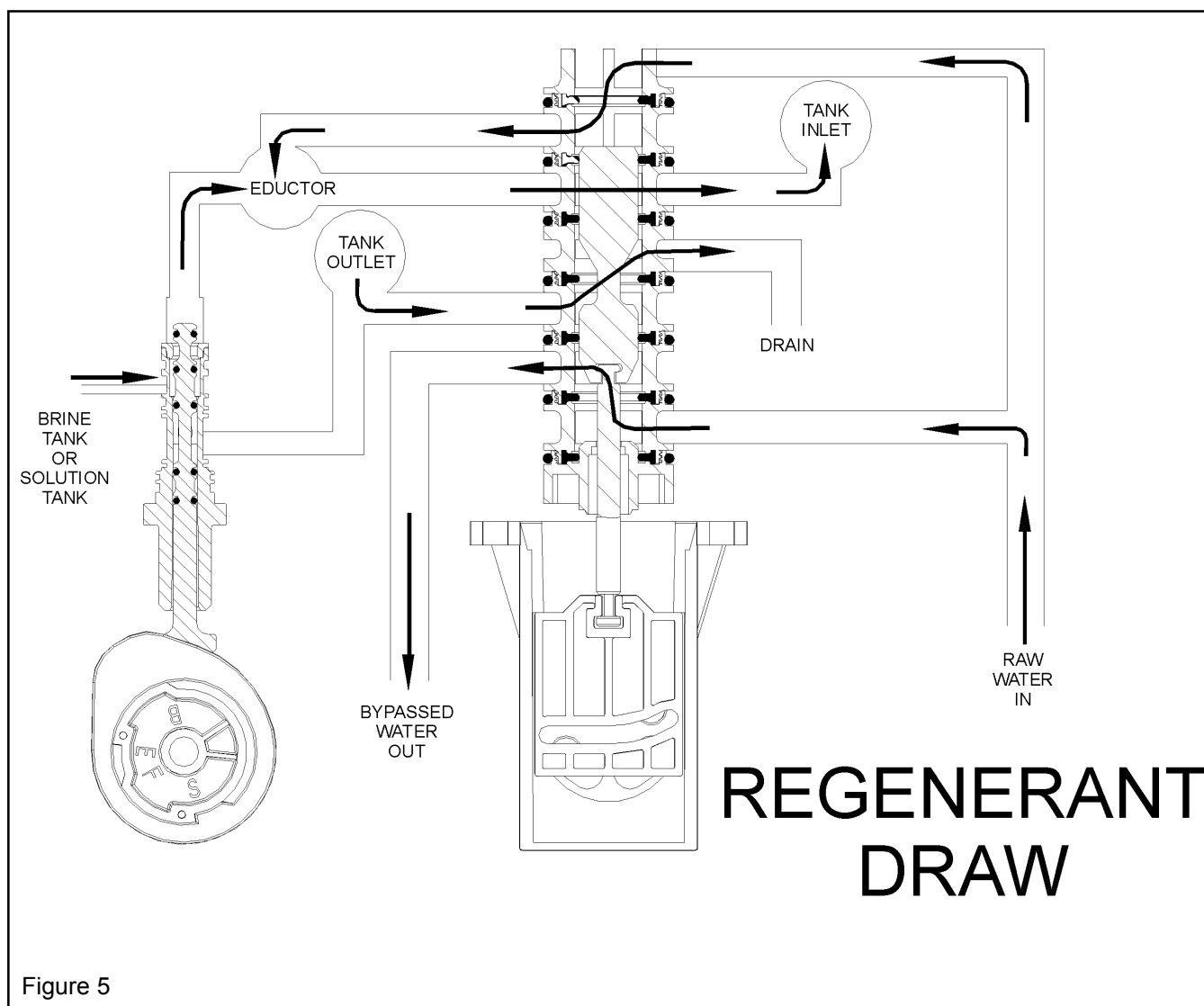


Figure 5

### Slow Rinse

Refer to Fig. 6

Raw water is directed from the inlet through the nozzle and into the throat. A vacuum is created but the brine valve has seated, so no brine is educted. The raw water enters the mineral tank, passes through the resin, up the manifold and to the drain. Hard water is allowed to service during regeneration.

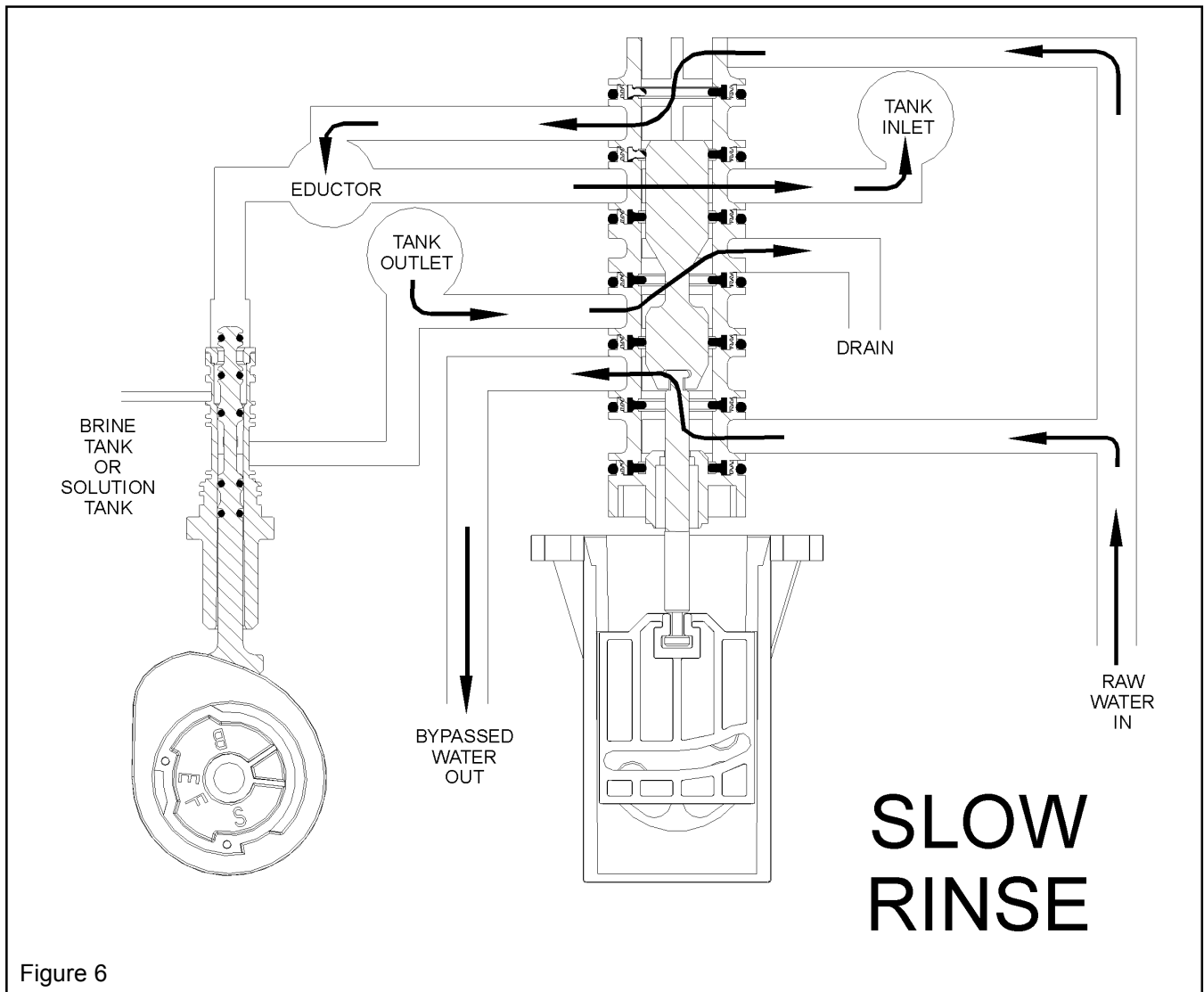


Figure 6

## Fast Rinse/Refill

Refer to Figure 7

Raw water is directed from the inlet, through the eductor and inlet to the top of tank, down the resin, up the manifold, out to drain and brine line until the correct amount of water is in the brine tank. Hard water is allowed to service during regeneration.

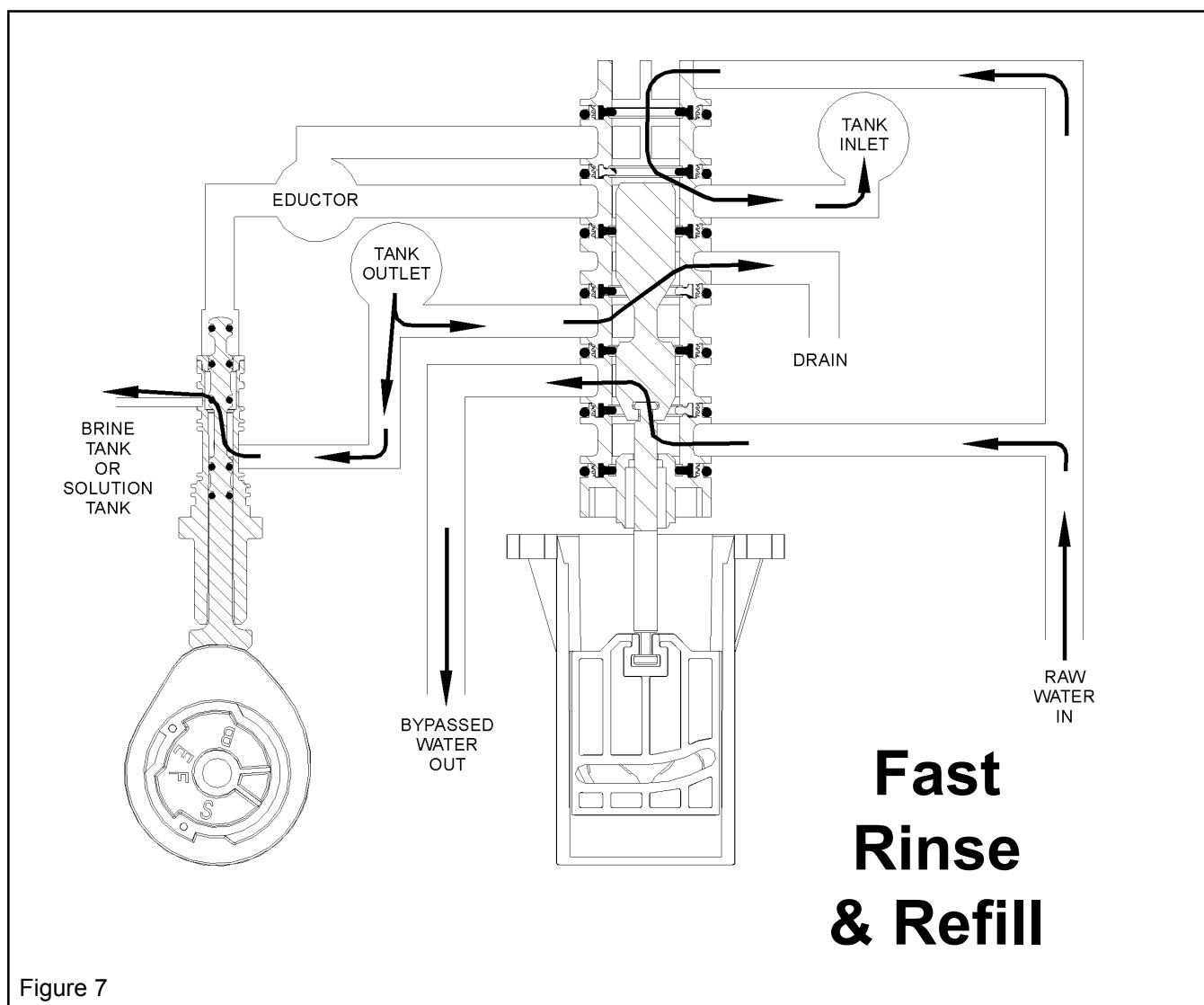


Figure 7

## Controller Features

The Culligan Gold Series™ control's primary function is to initiate and control the regeneration process via methods that are most convenient and cost effective for the customer while offering many operation features and benefits.

### Features

- **Power Source**

Electrical power required for the control is 24-VAC 50/60 Hz. A plug-in transformer (120v/24v) is provided

- **Battery Backup**

Battery backup is available as an optional field add-on. The battery backup will maintain the time of day for a minimum of 4 weeks using a 3.6V 1/2AA-lithium type battery as supplied by Culligan (PN 01013839).

- **EEPROM**

Saves programmed and statistical functions.

- **Lock/Unlock**

Allows the control to be easily locked out from inadvertent program changes or abuse. This feature can be disabled if desired.

- **Time of Day**

Displays current time in either 12 hour (AM/PM) or 24 hour format.

- **Regeneration Interval**

Provides an ability to initiate a time clock back-up operated system on a number of days (range from 1 to 99 days).

- **Program Beeper**

Emits an audible beep when key pads are depressed to help identify valid (short beep) or invalid (3 short beeps) key pad touches. Can be enabled or disabled as desired.

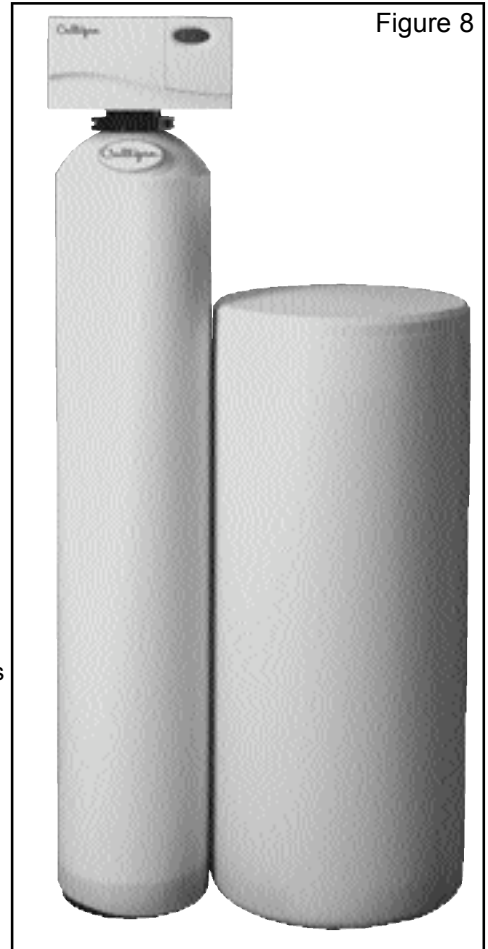


Figure 8

# Operation

## Modes of Operation

### Water Meter Mode

In water meter mode, the controller keeps track of the quantity of water that has flowed through the resin bed. Based on the influent water hardness and the hardness capacity of the resin bed, a service life expectancy in the quantity of softened water is calculated and programmed into the control. When the set point is reached, regeneration is triggered. In delay regeneration mode, if the predict mode is turned on, the average daily water usage will be compared to the remaining capacity at the regeneration delay time to predict if another day's water usage can occur before requiring regeneration. If enough capacity is not present then the regeneration will occur at that time. If the predict mode is not selected, the regeneration will start at time of regeneration. If time clock backup is set and the capacity has not been exhausted, the softener will regenerate when days since last regeneration equal time clock back up. In immediate mode the regeneration starts when the capacity is exhausted..

### Aqua-Sensor® Mode

The Aqua-Sensor® is a conductivity probe that senses when a hardness front passes through the resin bed. It functions independently of the influent water hardness so therefore, is useful in conditions when the influent water hardness varies throughout the year. It provides for the most efficient mode of operation. In addition to sensing when a resin bed is exhausted, it can also be used to determine when the brine solution is rinsed from the resin bed during the Brine Draw / Slow Rinse cycle triggering the control to move to fast rinse. This patented feature provides water savings by optimizing the amount of rinse water required to completely rinse out the resin bed.

### Time Clock Backup Mode

This setting is used as a backup feature for either the meter or Aqua-Sensor® modes of regeneration. It provides regeneration when a set period of time has elapsed. If the meter or Aqua-Sensor® does not trigger regeneration prior to the time clock backup value, the time clock backup will trigger the regeneration.

### Manual Regeneration

Pressing and holding the regen button for 3 seconds will initiate regeneration. The beeper is to give one beep at the start of manual regeneration (cam starts to turn). In delay mode, pressing and releasing the regen button will light the regen icon for regeneration to occur at the set delay time. Pressing and releasing the regen button again will turn off the regen icon. This function is active in the Service mode and Diagnostic mode. In the diagnostic mode, toggling the + key will advance to the next valve position while the regeneration is in process until home is reached. The statistics will not be updated if the last cycle of regeneration does not automatically complete (The "+" key is pressed to cycle the control to the next position).

### Predict Mode

The Predict Mode is used in the flow meter mode to determine the optimum regeneration point. Before the regeneration starts, the control will compare the remaining capacity value with the average daily water use. If the average daily water usage is less than the remaining capacity, the controller will wait 24 more hours before regeneration. If the remaining capacity is less than the average daily water usage, the control will initiate regeneration. This works in delay mode only. At any time, if the total capacity value is reached, the control will initiate an immediate regeneration.



## Efficiency Mode

Water softeners historically use an optimum time range to control the Regeneration cycle steps with a minimum and maximum time required to perform each step dependent on the salt being used, the hardness total and iron level. Culligan typically uses the maximum time range to ensure effective Regeneration. However, if the iron content of the water to be softened is zero, and the hardness level is less than 20 gpg, Culligan has developed a new set of regeneration times geared to reducing salt and water usage. These times are defined under a new operating mode coined "Efficiency Mode" (Not available if DIP switches #6 or #9 are on). Compared to the present time values used, these new regeneration times and salt dosages are considerably less. When in Efficiency mode, the control will refill for a higher salt dosage once every 10 regenerations according to tank size as shown in the following table.

Tank Sizes	Salt Dosages (lbs)
9x48	10
10x54	15
12x52	20
14x65	30

## Pre-Rinse Mode

The Pre-rinse mode is used in the Time Clock, Flow Meter, and Aqua Sensor® softener modes, as well as in Flow Meter Filter mode, to pre-rinse the softener resin bed or filter media. DIP switch 9 must be set to "on". The pre-rinse in flow meter mode will occur after the control has sensed that no water has flowed through the control for a period of X hours (can be set through the programming menu). When the control is in this mode, once the X amount of hours have elapsed the control will cycle to the fast rinse position for the pre-set length of minutes and then return to the home or service position. For Time Clock or Aqua Sensor® modes the pre-rinse will occur at a fixed time then return to the home or service position.

**Note:** Be sure to set the brine safety level float to the proper position when using this mode since the refill step also occurs in the fast rinse position. failure to do so will result in a higher salt dosage than anticipated.

# Installation

**Note:** Read this section entirely before starting the installation. Follow all applicable plumbing and electrical codes.

With the exception of media containers, open the remaining containers, remove all the components, and inspect them before starting installation.


## Placement

Refer to figure 9 for system placement.

- Set the media tank on a solid, level surface near water, drain and electrical facilities.
- Set the brine system on a flat, smooth, solid surface as near the media tank as possible.

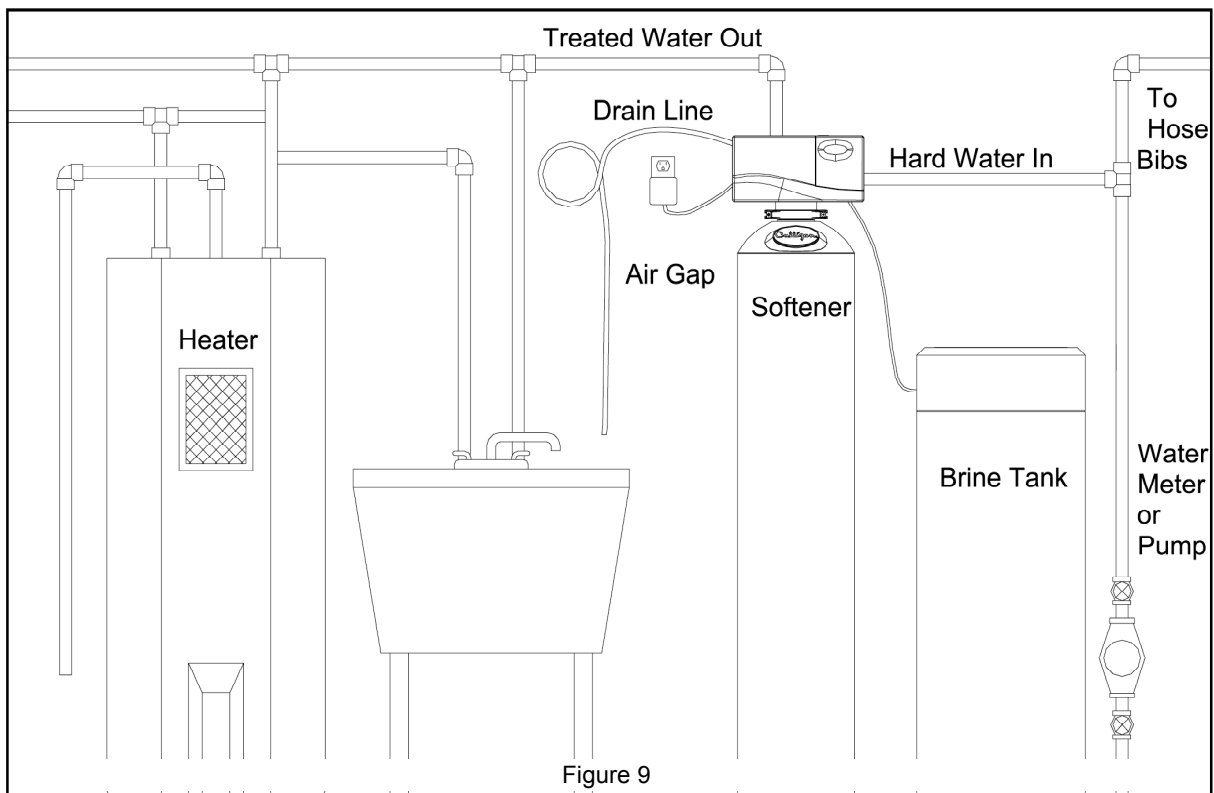
## Tank Assembly

Before the unit can be connected to the plumbing the manifold distributors must be assembled and the underbedding and resin must be loaded into the tank for 12" and 14" tanks.

 **CAUTION!** Do not lay the tank down unless a suitable lifting device is available. Personal injury and damage to the unit can result if dropped.

## Position the Mineral Tank(s)

Determine the location for the mineral tank(s) prior to loading, since they will be difficult to move after the underbedding and gravel are loaded.



## Loading the Tank (12" and 14" Tanks)

1. Position the tank so that the Culligan® logo is in the front.
2. Remove the inlet strainer.
3. Install the outlet manifold into the tank (Figure 10).
4. Cover the tops of the manifolds with a clean rag.
5. Using a large-mouth funnel, load the Culligan underbedding through the top of the tank.



**CAUTION!** DO NOT allow the outlet manifold to move when loading the media. The manifold must remain vertical to ensure a good seal at the gasket. Rap the tank near the bottom with a rubber mallet to level the sand.

6. Install the inlet strainer making sure to thread the strainer until it bottoms out on the tank thread. Failure to install the strainer correctly can cause the control to leak.
7. Aqua-Sensor® Installation (optional device)
  - A. Measure the sensor cable length as shown in Figure 10 and Table 1 (the Aqua-Sensor® cord is set at the factory for a 9" tank).
  - B. Loosen the small Aqua-Sensor® Plug, a needle-nose pliers works best.
  - C. Moisten the cable sheath and slide the cable grip up or down to the proper cable length.
  - D. Tighten the small Aqua-Sensor® plug so that the fitting cannot slide along the cable.
8. Load the tank with the Cullex® ion exchange resin. Leveling is not required. Remove the funnel.

**NOTE:** There must be no kinks or bends in the cable.

Dimension "X" is the exposed length the Aqua-Sensor® cord (cord length from the Aqua-Sensor® plug to the circuit board connector). You can then verify the Aqua-Sensor® probe is inserted to the proper depth by confirming dimension "X" is at the corrected length.

	X	Y
9" Quadra-Hull™ Tank	34 1/2"	40"
10" Quadra-Hull™ Tank	30 1/2"	44"
12" Quadra-Hull™ Tank	32 1/2"	42"
14" Quadra-Hull™ Tank	22 1/2"	52"

Table 1

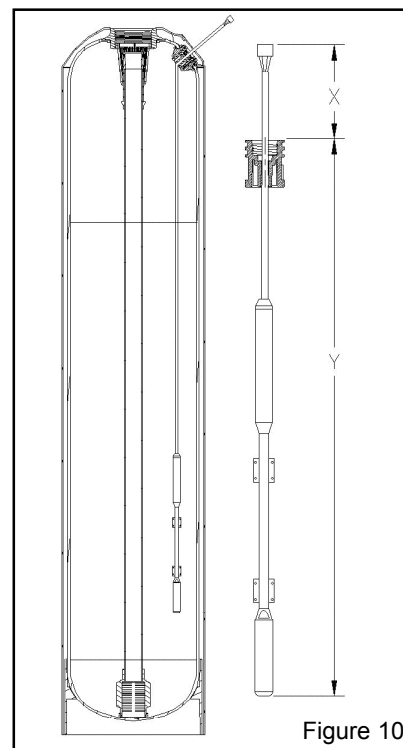


Figure 10

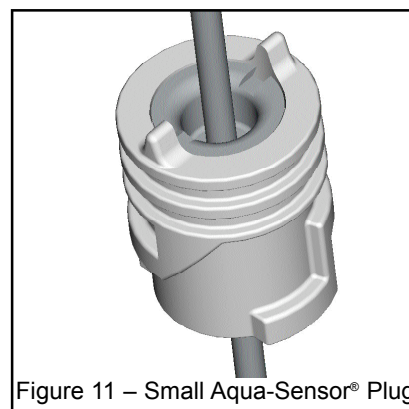


Figure 11 – Small Aqua-Sensor® Plug

## Mount the Control Valve

See Figure 12 for a visual on mounting the control valve to the tank.

- Assemble the o-rings, located in the parts pack, to the tank adapter.
- The valve adapter o-ring sits on the first step on the adapter. See Figure 13.

**NOTE:** Do not push the top o-ring down to the flange surface on the adapter.

**NOTE:** The larger of the two o-rings in the parts part goes between the adapter and the valve, do not stretch the smaller o-ring onto the top of the tank adapter.

- Lubricate only the top o-ring on the tank adapter, and the outlet manifold o-ring with silicone lubricant.
- Screw the adapter into the tank until the adapter bottoms out on the tank flange.

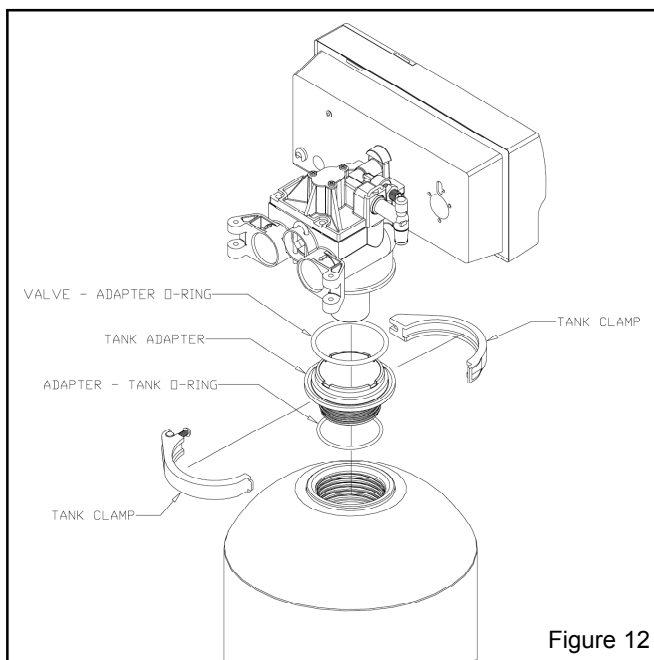
**NOTE:** The adapter only needs to be tightened hand-tight to the tank flange.

- Align the manifold with the center opening in the valve, and press the valve onto the adapter firmly.

**NOTE:** Make sure to push the valve straight down onto the manifold. If the valve is cocked, it may cause the o-ring to slip off the manifold.

- Assemble the tank clamp to the control, and tighten the clamp screw.

**NOTE:** The clamp and valve will be able to rotate on the tank until pressure is applied.



## Flow Control Eductor Nozzle

Listed below is the recommended eductor nozzle to be used at various salt dosages.

Refer to Figure 14 for a visual on changing the eductor nozzle and the backwash flow control.

Table 2 - Flow Restrictors

Unit	Backwash Flow	Nozzle	Throat	Brine Refill Flow
9"	2.0 gpm (#2 Brown)	Blue*	Light Brown*	0.45 gpm
10"	2.0 gpm (#2 Brown)	Beige	Light Brown	0.45 gpm
12"	3.5 gpm (#3 Green)	Beige	Light Brown	0.8 gpm
14"	5.5 gpm (Black)	Green	Blue	0.8 gpm

\* Standard from factory

### Eductor Nozzle Replacement:

- Remove the three screws on the eductor cap and remove the cap.
- Remove the eductor assembly.
- Remove the eductor screen from the assembly
- Remove the blue nozzle and replace it with the beige nozzle. Make sure to put the o-ring on the correct nozzle.
- Reverse the procedure to reassemble. To prevent leaks, ensure that the gasket is in the proper position.

### Backwash Flow Control Replacement:

- Remove the drain clip and pull the drain elbow straight off.
- Remove the backwash flow control located behind the elbow.
- Install the correct backwash flow control.

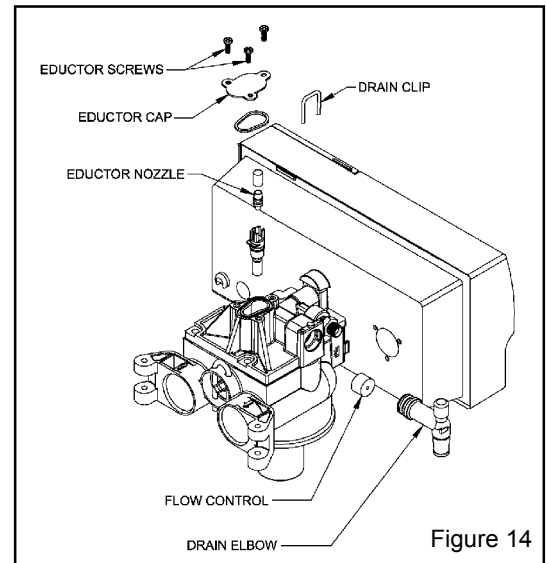


Figure 14

**NOTE:** The number on the flow control should face into the valve body.

- Reverse the procedure to reassemble.

**NOTE:** Dip switch #5 is to be in the "off" position for 9" and 10" Tanks (0.45 gpm refill flow control). Dip switch 5 is to be in the "on" position for 12" and 14" tanks (0.80 gpm brine refill flow control).

## Plumbing Connections

Shipped with each softener is a Culligan® bypass valve, which is used to connect the softener to the plumbing system. The bypass allows the softener to be isolated from the water service line if service is necessary while still providing water to the home. The bypass valve can be directly plumbed into the system, or can be connected with the following optional sweat connection kits;

- P/N 01010783 1" Sweat Copper Adapter Kit
- P/N 01016564 3/4" Sweat Copper Adapter Kit
- P/N 01016565 3/4" Elbow Sweat Copper Adapter Kit



**CAUTION!** Close the inlet supply line and relieve system pressure before cutting into the plumbing! Flooding could result if not done!

**CAUTION!** When making sweat connections, use care to keep heat away from the plastic nuts used to connect the plumbing to the bypass. Damage to these components may result otherwise.

## Bypass Valve Installation

The bypass valve connects directly to the control valve with a pair of couplings and two assembly pins (Figure 15). Lubricate all o-rings on the couplings with silicone lubricant.

On Soft-Minder® meter controls, the meter replaces the coupling on the outlet side of the control. The meter body fits in the same space as the coupling between the control valve and the bypass. Make sure that the arrow on the flow meter is pointing in the direction of flow (Figure 15).

**NOTE:** The bypass stem can only be removed from valve on the bypass side (red knob). The bypass valve is designed so that it can be flipped over, with the bypass (red) knob on the left side of the valve. This will need to be taken into consideration if the control is plumbed in close to a wall which may prevent the stem from being easily removed.

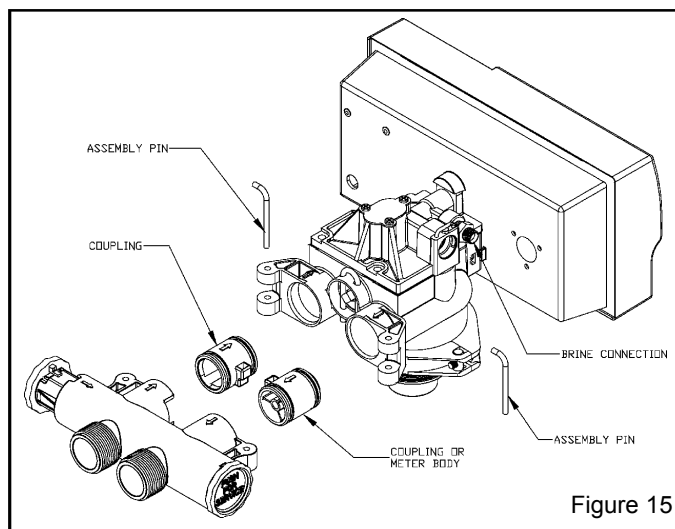


Figure 15

The bypass valve has knobs that easily snap on and off of the stem. A screwdriver can be used to depress the snap lever on the stem for knob removal. The knobs have alignment tabs that mate into the notches in the bypass body to ensure that the stem is properly aligned in the bypass body. The service knob (blue) has a locking feature, which must be depressed in order to shift the stem out of the bypass position (Figure 16).

**NOTE:** If the ground from the electrical panel or breaker box to the water meter or underground copper pipe is tied to the copper water lines and these lines are cut during installation of the bypass valve, an approved grounding strap must be used between the two lines that have been cut in order to maintain continuity. The length of the grounding strap will depend upon the number of units being installed. In all cases where metal pipe was originally used and is later interrupted by the bypass valve to maintain proper metallic pipe bonding, an approved ground clamp c/w not less than #6 copper conductor must be used for continuity. Check your local electrical code for the correct clamp and cable size.

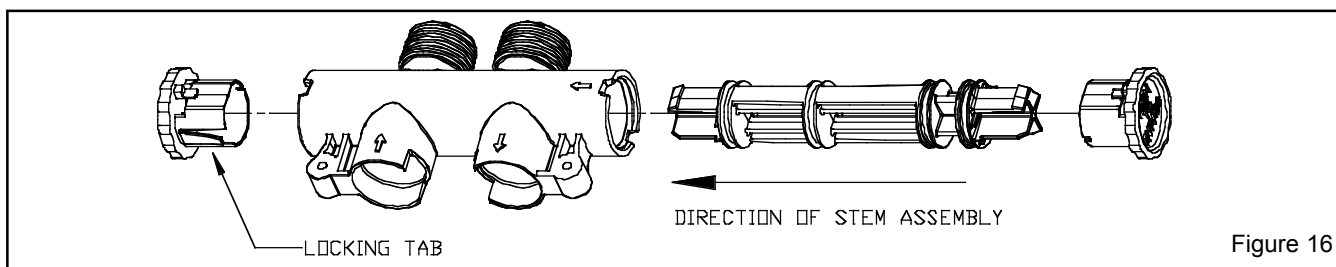


Figure 16

## Drain Line Connection

Refer to Table 3, under the applicable tank size for drain line length and height limitations.

- Remove 1/2" pipe clamp from the small parts pack included with the control.
- Route a length of 1/2" drain line from the drain elbow to the drain.
- Fasten the drain line to the elbow with the clamp.
- Secure the drain line to prevent its movement during regeneration. When discharging into a sink, or open floor drain, a loop in the end of the tube will keep it filled with water and will reduce splashing at the beginning of each regeneration.

**NOTE:** Waste connections or drain outlets shall be designed and constructed to provide for connection to the sanitary waste system through an air gap of 2 pipe diameters or 1 inch, whichever is larger.

**NOTE:** Observe all plumbing codes. Most codes require an anti-siphon device or air gap at the discharge point. The system and installation must comply with state and local laws and regulations.

Operating Pressure	Height of Discharge Above Floor Level Operating					
	0 ft (0 m)	2 ft (0.6 m)	4 ft (1.2 m)	6 ft (1.8 m)	8 ft (2.4 m)	10 ft (3 m)
30 psi (210 kPa)	60 ft (18 m)	50 ft (15 m)	30 ft (9 m)	15 ft (5 m)	Not allowable	Not allowable
40 psi (279 kPa)	100 ft (30 m)	90 ft (27 m)	70 ft (21 m)	50 ft (15 m)	30 ft (9 m)	12 ft (4 m)
50 psi (349 kPa)	145 ft (41 m)	115 ft (35 m)	80 ft (24 m)	80 ft (24 m)	60 ft (18 m)	40 ft (12 m)
60 psi (419 kPa)	Normal installation should not require more than 100 ft (30 m) of drain line				85 ft (26 m)	60 ft (18 m)
80 psi (559 kPa)					140 ft (43 m)	120 ft (37 m)
100 psi (699 kPa)						150 ft (46 m)

Table 3

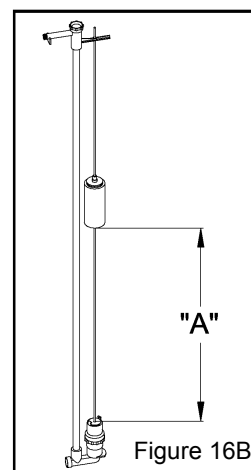
### Fill The Salt Storage Container

Fill the salt storage container with water until the level reaches about 1 inch above the salt support plate. Pour salt into the container. Fill with salt to within a few inches of the top.

### Brine Valve "A" Dimension

The Culligan Gold Series™ unit contains a brine float which can serve as a backup refill shutoff in the event of a failure, such as a power outage when in the refill position. The float level should be set based on the salt dosage setting. Refer to Figure 16B.

- Lift the brine valve from the brine chamber.
- Find the correct "A" dimension from Appendix A, Table 5.
- Set the distance from the top of the filter screen to the base of the float accordingly. The slight difference in height when the float is pulled up or down is negligible.



### Aqua-Sensor® Probe and Soft-Minder® Meter Connection

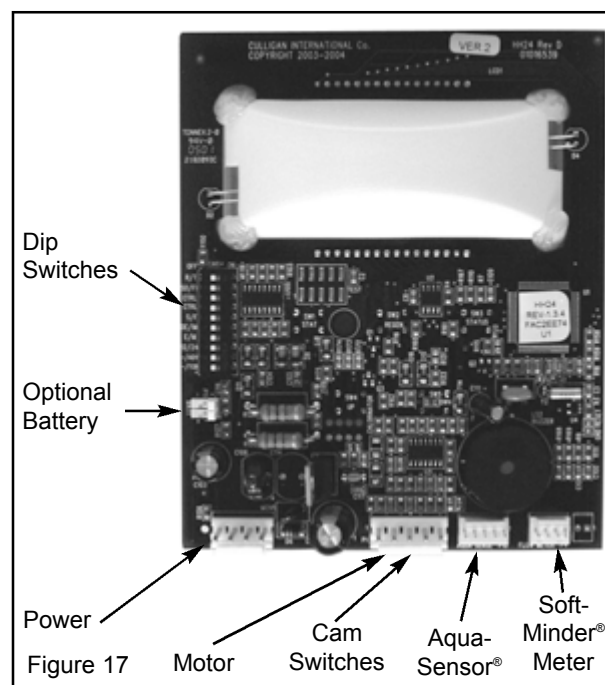
To connect the probe or meter leads refer to Figure 21 and proceed as follows:

- Remove the timer case from the back plate.
- Snap the circuit board holding plate off the back plate to provide access to the back of the circuit board.
- Remove the plastic plug from the backplate.
- Slip the sensor probe lead or meter cable through the hole and toward the circuit board.

**NOTE:** The strain relief located on the back of the wire connection for the Aqua-Sensor® probe may have to be removed in order to fit it through the backplate. Replace the strain relief if you need to remove it for assembly.

- Connect the lead to the circuit board. The Aqua-Sensor® probe terminal is labeled "Aqua-Sensor®" while the Soft-Minder meter terminal is labeled "Flow Meter".
- Pull any excess cable wire back out of the enclosure, and route the wiring inside the enclosure to avoid any interference with moving parts.
- Locate the strain relief bushing in the parts pack. Place it on the cable at the point of entry to the rear of the timer plate and push it into the hole.

**NOTE:** The wire connectors must be connected to the circuit board properly. The wires must exit the plug-in connector opposite of the raised white base of the circuit board connector. Failure to properly connect any of the connectors will result in a malfunction of the circuit board operation.



## Connect the Brine Line

- Use the length of brine line included in the brine tank, or measure a length of brine line sufficient to reach from the brine tank to the brine fitting, with no sharp bends. For easier access to the float it is recommended to add an extra four feet (1.3 meters) of length to the brine line. Cut both ends of the brine line squarely and cleanly.
- Remove the brine valve from the brine tank and then remove the white nut and insert from the float rod. Return float rod to its original position.
- Slip the white nut over one end of the tubing and press the plastic insert into the end of the tubing (Figure 18). Connect to the brine valve and tighten nut.
- Remove white nut and plastic insert from the small parts pack.
- Slip the white nut over one end of the tubing and press the plastic insert into the end of the tubing (Figure 18). Connect to the brine connection on the valve and tighten nut.

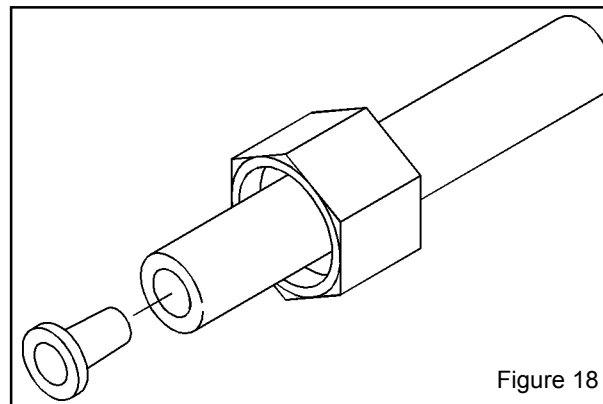


Figure 18

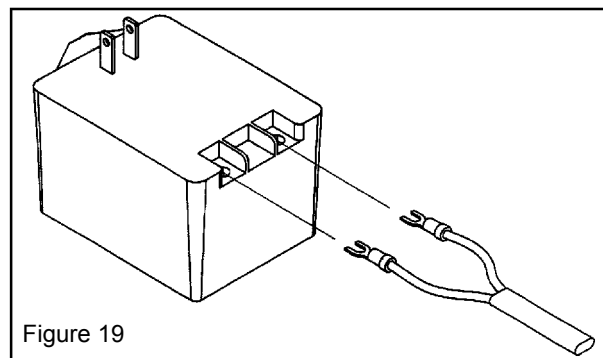


Figure 19

## Electrical Connection

The power cord needs to be connected to the plug-in transformer. Figure 19 shows the cord attachment to the transformer for non Aqua-Sensor® models.

**Note:** Observe all state and local electrical codes.

The Aqua-Sensor® probe (Figure 20) requires a 2.5 VAC power source. This source is provided via two of the posts on the 24V/2.5V transformer. Two leads from the transformer must be wired to the 2.5 VAC terminal on the circuit board. The wire connector from the Aqua-Sensor® probe is simply plugged in the circuit board (Figure 21).



**CAUTION!** Failure to connect power to the correct terminals will damage the circuit board!

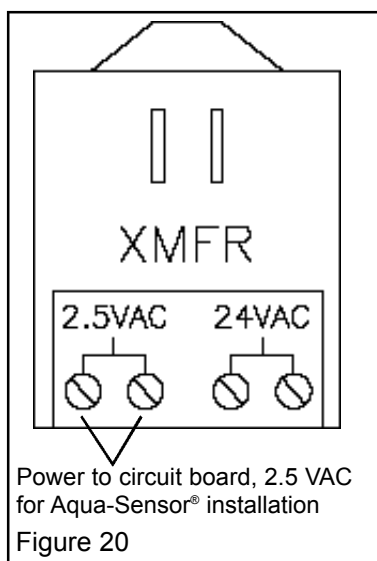


Figure 20

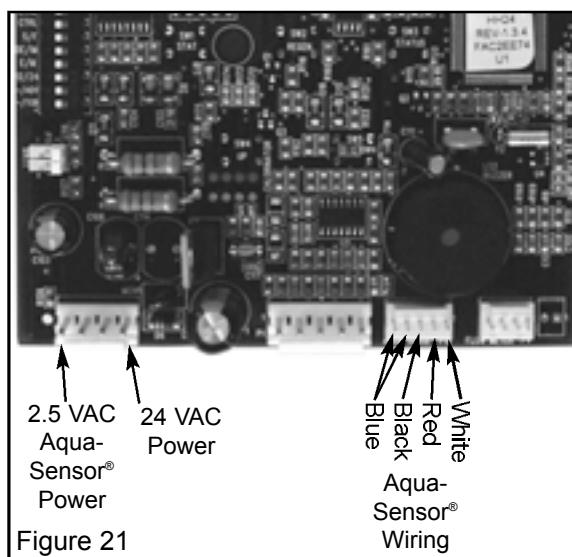


Figure 21



## Switch Definitions

The circuit board is shipped with all DIP switches in the off position. Prior to programming the controller some DIP switches may need to be moved to the ON position. Because each switch serves a specific purpose, please review the following information, moving the required switches to an ON position as necessary for each controller in the system. The definitions and purpose are as follows:

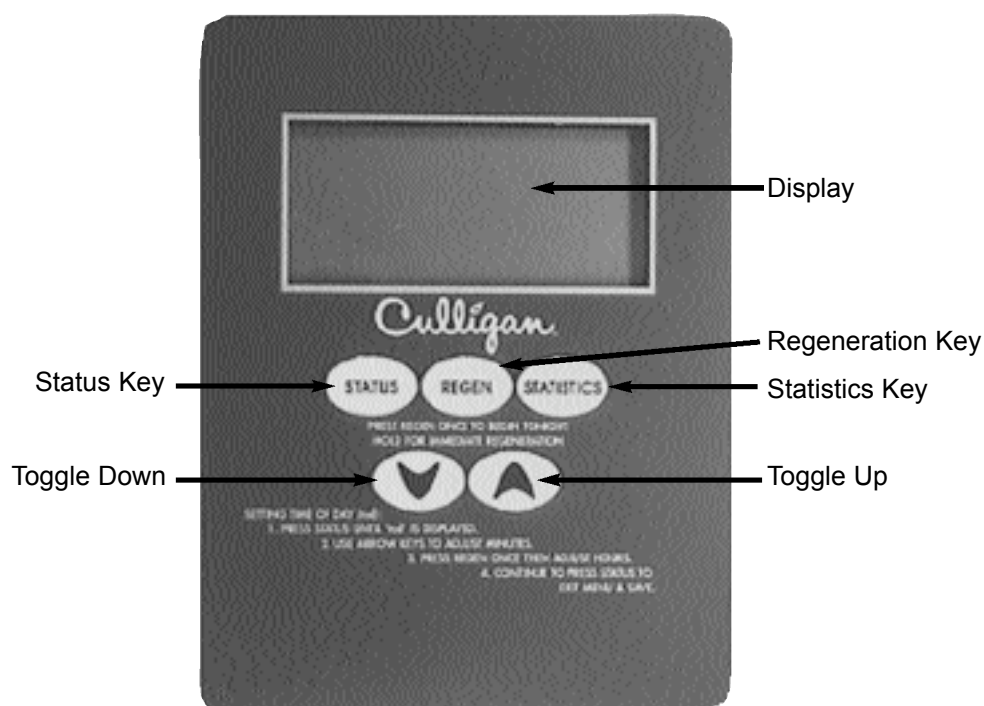
Switch #	Abbreviation	Definition	Purpose
1	R/T	Run/Test	Off - Allows controller to function in a normal, operational mode.
			On - Places controller in test mode to verify operation of the board components.
2	SO/FI	Softener/Filter	Off - The unit shall be operated as a softener.
			On - The unit shall function as a filter. The default time programmed for cycle #2 shall be 2 minutes.
3	CTLR	Control Selection	See DIP switch settings below for control selection.
4	CTLR	Control Selection	See DIP switch settings below for control selection.
5	S/F	Standard Refill/ Fast Refill	Off - The 0.45 gpm refill flow control is used to control the refill flow rate. Set in the off position for 9" and 10" units.
			On - The 0.80 gpm refill flow control is used to control the refill flow rate. Set in the on position for 12" and 14" units.
6	D/I	Demand/Immediate	Off - Regeneration of a unit will occur at a user-selected time of day.
			On - Regeneration shall occur immediately upon a controller receiving a valid regeneration initiation signal, regardless of the time of day.
7	E/M	English/Metric	Off - The unit will function in standard English dimensions.
			On - The unit will function in standard metric dimensions.
8	12/24	12 Hour Clock/ 24 Hour Clock	Off - All time keeping functions shall be based on an AM/PM basis. The AM or PM icon shall be lit in the display as appropriate.
			On - Time keeping functions shall work on a 24-hour clock (military time). The AM/PM display icons will be disabled.
9	-ADV	Advance Off/ Advance On	Off - The Predict Mode and Pre-Rinse Mode will not be activated. (Efficiency will be active)
			On - The Predict Mode and Pre-Rinse Mode will be activated. (Efficiency will not be active)
10	-/TCB	Time Clock Back-up Disabled/Enabled	Off - The time clock backup option is not enabled.
			On - Allows the user to enable the time clock function of the control as a backup regeneration initiation option. This feature is used as a back up to a primary device such as a flow meter, Aqua-Sensor®.

Table 4

Dip #3	Dip #4	Control
Off	Off	Gold
On	Off	Platinum
Off	On	Other
On	On	Other

Table 5

**Note:** Dip Switch 5 is to be in the "Off" Position for 9" and 10" tanks (0.45 gpm brine refill flow control). Dip Switch 5 is to be in the "On" position for 12" and 14" tanks (0.80 gpm brine refill flow control).



Display	Back lit LCD display.
Status Key	Depress to enter and move through the programming steps.
Regeneration Key	Press and hold the key for three (3) seconds to initiate an immediate regeneration. When pressed during programming the time of day, this key will allow the user to toggle between the hours and minutes setting of timing program segments.
Statistics Key	Each time depressed, the Statistics key will display statistical information such a flow rate, time of day. Use with the Toggle Down key to display other statistical information.
Toggle Down Key	In the programming mode this key will move the user through the programming function in a descending mode. If depressed for greater than three seconds, the rate at which the display scrolls through data will increase.
Toggle Up Key	In the programming mode this key will move the user through the programming function in an ascending mode. If depressed for greater than three seconds, the rate at which the display scrolls through the data will increase. This key will also allow the user to manually step through the cycles of regeneration.

Table 6

## Programming Menus

The programming menus will vary depending on which devices are connected to the circuit board and dip switch settings.

Pressing the "Status" key enters the standard programming mode. Repeated presses of the "Status" key will scroll through the programming menu to each desired setting. The value is then set by using the "+" and "-" keys to increment or decrement the value. Pressing the "Status" key, after value selection, saves the programmed value to EEPROM (unless otherwise specified; some settings are temporarily stored before they are saved). To exit the programming mode, repeatedly press the "Status" key until the display returns to time of day display. The following table outlines all of the programming functions, range limits and default settings:

Setting	Range Limits	Default	Comments
* Beeper	Toggle (Y / N)	Y	Enable/disable the key press beeper (ERR/Alarm Code beeps can't be disabled)
Time of Day	12:00AM-11:59PM(12hr) 00:00-23:59 (24hr)	12:00 PM 12:00	12 / 24 hour function set with dip#8
* Time of Regen	12:00AM-11:30PM(12hr) 00:00-23:30 (24hr)	2:00 AM 02:00	Adjustable in 30 minute increments only
* Regen Interval	Days - 1 to 99 days	3 days	Displayed in Time Clock Mode (displayed in Flow Meter and A/S If dip#10 on)
*‡ Hardness Type	S - Standard Metric, F - French Metric, D - German Metric	S - Standard Metric	Only active with flow meter if dips#3&4 are set to Gold or Platinum and dip#7 is set to 'metric' (Not available in Filter operation)
*‡ Hardness	1 - 110 English 1 - 110 Standard Metric 2 - 189 Metric French 1 - 105 Metric German	25 - English 25 - Standard Metric 43 - Metric French 24 - Metric German	Only displayed if DIP Switch 3 & 4 are set to Gold or Platinum and flow meter attached (Not available in Filter operation)
*‡ Iron	0 - 5	0	Only displayed if DIP Switch 3 & 4 are set to Gold or Platinum and flow meter attached (Not available in Filter operation)
*‡ Salt Type	KCl or NaCl	NaCl	Only displayed if DIP Switch 3 & 4 are set to Gold or Platinum and flow meter attached (Not available in Filter operation)
*Predict Mode	Yes or No	No	Only Active if DIP Switch 9 is on and DIP Switch 6 is off and a flow meter is connected to the control (Not available in Filter operation)
*Pre-Rinse Mode	Yes or No	No	Only active if DIP Switch 9 is on.
*Pre-Rinse Duration	01 - 15	05	Only active if DIP Switch 9 is on and the Pre-Rinse mode is set to 'Yes'.
*Pre-Rinse Hours	1 - 240	24	Only active if Dip Switch 9 is on and Pre-rinse mode set to yes and a flow meter is connected to the control
*Pre-Rinse Time of Day	12:00AM-11:30PM(12hr) 00:00-23:30 (24hr)	5:00 AM 05:00	Only active if Dip Switch 9 is on and Pre-rinse set to 'yes'; Adjustable in 30 minute increments only; Available only in TimeClock and Aqua-Sensor® mode (not meter mode)
*‡ Efficiency Mode	Yes or No	No	Available only if DIP Switch 3 & 4 are set to Gold or Platinum with flow meter connected; Iron = 0; Hardness <= 20 (English hardness units) "Efficiency Mode" icon lit when enabled (Not available if dips#6or9 on, or Filter mode)
*‡ Gold Tank Size	9x48, 10x54, 12x52, 14x65	9x48	Only displayed if DIP Switch 3&4 are set to Gold or Platinum, respectively and a flow meter is connected (Not available in Filter operation)
*‡ Platinum Tank Size	10x54, 12x52, 14x65, 16x65	10x54	
*‡ Defaults	Yes or No	Yes	Only displayed if DIP Switch 3&4 are set to Gold or Platinum and a flow meter is connected. (Not available in Filter operation)
View	Y or N	N	Only displayed if "Defaults" was set to "YES"
*Salt Dosage	3 - 60 Lbs 0.5 - 27.5 kg	Timeclock/ Aqua-Sensor®: 7Lb/3.0kg; Flowmeter: default varies based on tank size	If DIP Switch 3 & 4 are set to Gold or Platinum (Not Available if DIP Switch 3 & 4 are set to other). (Not available in Filter operation)
* Meter "K" Factor	0.5 - 500	50.0	Only displayed with Flow meter connected and DIP Switches 3 & 4 on (other).
* Cycle 1 time	1 to 99 minutes	10min (5min efficiency mode)	
* Cycle 2 time	1 to 99 minutes	<b>Softener mode</b> -TC mode or dips#3&4 set to other-60 mins; Flow meter-lookup table; A/S mode-99 minutes <b>Filter mode</b> - 2 minutes	-Softener / Filter function set with DIP switch #2 -For Gold or Platinum: cycle time default is loaded from table; -flow meter must be connected
* Cycle 3 time	1 to 99 minutes	10 minutes	Only displayed if DIP Switch 3 & 4 are set to Platinum or Other.
* Cycle 4 time (if 5 cycle valve)	1 to 99 minutes	10 minutes Filter-2 minutes	Only displayed if DIP Switch 3 & 4 are set to Platinum or Other(with 5 cycle valve detected)
*** Day(s) of Week Regen	'dAYoWK' Yes or No	No	Time Clock Mode Only; Active for softener and filter
***Regeneration Day(s)	Scroll days of the week, Toggle Y/N	SUN N	Only active if 'dAYoWK' was set to 'Yes'
*** Current day of week	Scroll days of the week	SUN	Only active if at least one day of the week was 'Y' in 'Regen Day(s)' above
* Total Capacity Set Point (MaxCap)	1 - 999,999 (can't be set less than BATCH)	999,999 (other or filter); Calculated for (Gold or Platinum softeners)	-Set point to trigger immediate regen -Only active with flow meter connected -(For Filter operation, see filter media life feature description)
*Filter Media Life	Toggle (Y or N)	N	Enable/disable the filter media life feature (filter Operation ONLY)
* Batch Capacity	1 - 999,999 (can't be set greater than MaxCap)	870 (other or Filter); Calculated for (Gold or Platinum softeners)	-Only active with flow meter connected -For Gold or Platinum, the value shown is calculated by control; value may be overridden by user by setting 'defaults' to 'no'
* Lock / Unlock	Toggle Lock & Unlock	Unlock	-Lock or unlock access to program changes -Only accessible from service mode, time of day display; press and hold '+' and '-' keys together for 5 seconds- (not while in programming menu)

\*To be saved in EEPROM

‡Temporarily stored value; only saved to EEPROM when 'status' key is pressed at 'dEFLtS' setting. This applies ONLY to flow meter mode, with dips#3&4 set to Gold, Platinum, or Europe.

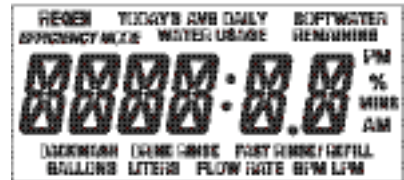
\*\*\* only active in time clock mode; value saved in EEPROM.

## Display Icons

The display is to be backlit and have the icons as shown below.

## Custom LCD Display

Six standard 12-segment alpha-numeric characters, a decimal separating the first and second character, a colon separating the second and third character positions, AM, PM, REGEN, EFFICIENCY MODE, TODAY'S, AVG DAILY, WATER USAGE, SOFWATER, REMAINING, %, MINS, BACKWASH, BRINE RINSE, FAST RINSE, /, REFILL, GALLONS, LITERS, FLOW RATE, GPM, LPM Icons



A further description of each programming setting and the corresponding display is outlined below. For a display that has an icon that is displayed solid for the 2 second time period prior to bringing up the settings, the settings menu can be reached prior to the two second time out by pressing the "+" or "-" key.

- **Beeper Setting** - This setting is used to turn the beeper on or off for each key press actuation. The display will show "bEEP X" where X is either "Y" or "N". The "Y" or "N" will be toggled with the "+" and "-" keys. Setting the Beep option to "N" will only disable the beeper for key press actuation. The beeper will still be active for error and alarm codes.

Pressing the "Status" key will save the setting and move to the next programming step.



- **Time of Day** - This setting is used to program the current time of day. When in this step the display will first show "tod" for two seconds. After "tod" is displayed, "12:00 PM" will display (or the current set time if already programmed) and the minutes will flash. The minutes are adjusted with the "+" or "-" key until the correct value is displayed.

Press the "Regen" key to flash the hours. Adjust with the "+" or "-" key until the correct time is displayed.



Pressing the "Status" key will save setting and move to the next programming step. Pressing "Regen" will move back to the minutes adjust.

- **Time of Regeneration** - This setting is used to program the time at which a regeneration is to occur in the delay mode, or in immediate mode with time clock backup on. The display will first show "tor" for two seconds.

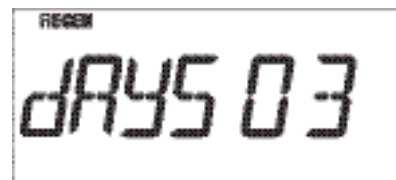
After "tor" is shown the display will then show the default of 2:00 AM (or the current programmed time of regeneration if already set). The time can be adjusted in 30 minute increments by pressing the "+" or "-" keys.

Pressing the "Status" key will save the setting and move to the next programming step.

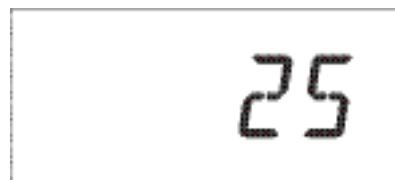
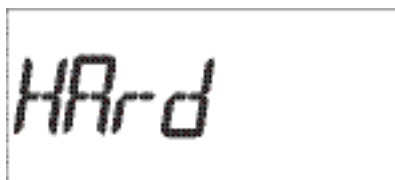


- **Regeneration Interval** - This setting is used to set the days between regeneration in time clock mode. It is also active in meter or Aqua-Sensor® mode if the time clock backup DIP switch # 10 is set to on. The display will show "REGEN" icon and "dAYS" as well as the numbers to change. Adjust the value with the "+" or "-" keys.

Pressing the "Status" key will save the setting and move to the next programming step.



- **Hardness Setting (flow meter only)** - This setting is used to set the hardness (grains) of the influent water supply. The display will only appear if a flow meter is connected to the circuit board and the control is set to Gold or Platinum (softener mode only). For English Units the display will first show "Hard" for two seconds and then display the Hardness default (or the previously programmed value). Adjust the value with the "+" or "-" keys.



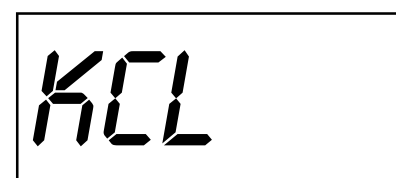
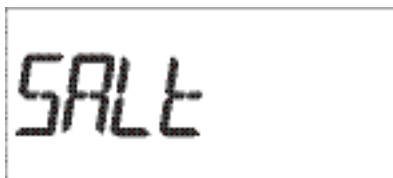
(These settings will not get saved to EEPROM until the 'status' key is pressed while at the 'dEFLtS' programming step)

- **Iron Setting (flow meter only)** - This setting is used to set the iron level (PPM) of the influent water supply. The display will show "Iron" in the left most digits and the iron default setting (or the previously programmed value) in the far right digit. The display will only appear if a flow meter is connected to the circuit board and the control is set to Gold or Platinum (softener only). Adjust the value with the "+" or "-" keys.

Pressing the "Status" key will temporarily store the setting and move to the next programming step. (This setting will not get saved to EEPROM until the 'status' key is pressed while at the 'dEFLtS' programming step)



- **Salt Type (flow meter only)** - This setting is used to select the regeneration salt type (softener mode only). This display will only appear if dips#3&4 are set to Gold, Platinum, or Other. The display will show "SALT" for 2 seconds. Then display the default 'NACL'. Pushing the "+" or "-" keys will change to 'KCL'.



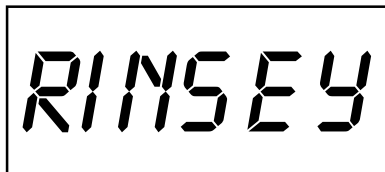
Pressing the "Status" key will temporarily store the setting and move to the next programming step. (This setting will not get saved to EEPROM until the 'status' key is pressed while at the 'dEFLtS' programming step)

- **Predict Mode (flow meter only)** - This setting will only be displayed if dip#9 is on, dip#6 is off, and a flow meter is connected. Only available in softener mode. The display will show "PRED" in the left most characters and toggle between "Y" and "N" in the right most character with the "+" and "-" keys. Pressing the "Status" key will save the setting and move to the next programming step.



# Programming

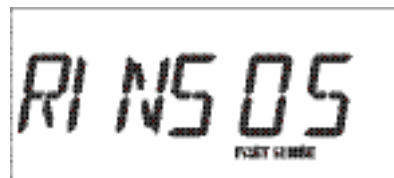
- **Pre-Rinse Mode** - This setting will only be active if dip#9 is on. The display will show "PRE-" for two seconds and then "RINSE" in the left most characters of the display. When "RINSE" is shown the right most character of the display will flash "N" and toggle to "Y" with the use of the "+" or "-" keys.



Pressing the "Status" key will save the setting and move to the next programming step.

- **Pre-Rinse Time Duration** - This setting is used to set the length of time that the control will be in the fast rinse position before returning to the Service (Home) position. The display will show "RINS" and XX where XX is the length in minutes that the control is to pre-rinse as well as the "FAST RINSE" icon. Adjust the XX value with the "+" and "-" keys.

Pressing the "Status" key will save the setting and move to the next programming step.

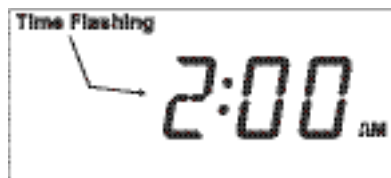
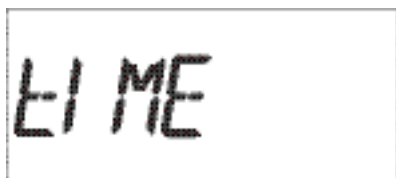


- **Pre-Rinse Hours** - This setting will only be active if the Pre-Rinse mode is set to 'Yes' and a flow meter is attached to the control. The display will show "HOURL" in the left most characters and "XX" in the right most digits where "XX" represents the hours setting from 01 - 99. The hours setting is adjusted with the "+" and "-" keys.

Pressing the "Status" key will save the setting and move to the next programming step.



- **Pre-Rinse Time of Day** - This setting will only be active if the Pre-Rinse mode is set to 'Yes' and the control is operating in time clock or Aqua-Sensor® mode. The Display will show "TIME" for 2 seconds and then the flashing time display as in the time of regeneration display. The time can be adjusted in 30 minute increments with the "+" and "-" keys.

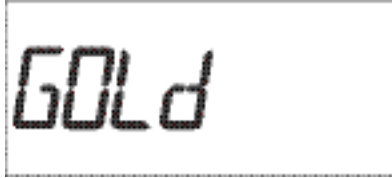


Pressing the "Status" key will save the setting and move to the next programming step.

- **Efficiency Mode (flow meter only)** - Efficiency mode will only be active if the conditions as explained earlier are met (Not available if DIP switch #6 or DIP switch #9 are on). The "EFFICIENCY MODE" Icon will be displayed with a default of "YES". Toggle between "YES" and "NO" with the "+" or "-" key. Pressing the "Status" key will temporarily store the setting and move to the next programming step. (This setting will not get saved to EEPROM until the 'status' key is pressed while at the 'dEFLtS' programming step)

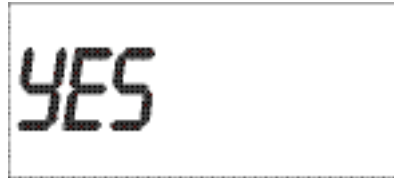
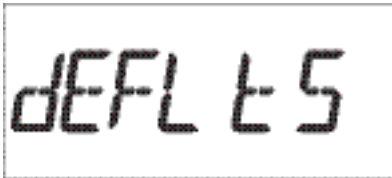


- **Gold Tank Sizes (flow meter only)** - This setting is used to determine what size tank the control is connected to. It will only appear if DIP Switch 3 & 4 are set to Gold, Platinum and a flow meter is connected to the circuit board. The display will first show "GOLD" or "PLATIN" for two seconds and then display the tank size default (or the previously programmed value). Adjust the tank size with the "+" or "-" keys.



Pressing the "Status" key will temporarily store the setting and move to the next programming step. (This setting will not get saved to EEPROM until the 'status' key is pressed while at the 'dEFLtS' programming step)

- **Defaults (flow meter only)** - This setting allows the control to automatically determine what the values shall be for salt dosage, cycle times, batch capacity, and total capacity based on the "temporarily stored" values above. The display will first show "dEFLtS" for two seconds and then display "YES" or "NO", with "YES" being the default. "YES" and "NO" are toggled with the "+" or "-" keys. This feature will only appear if dips#3&4 are set to GOLD or PLATINUM and a flow meter is attached.

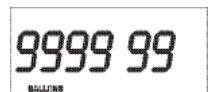
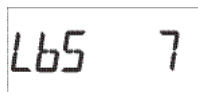
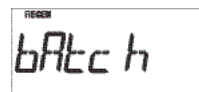
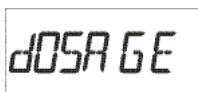
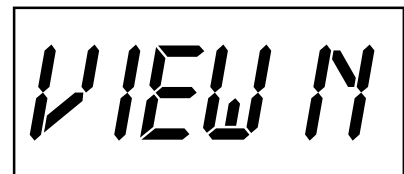


**If 'YES' is chosen**, then pressing the "STATUS" key will let the control automatically lookup, calculate, and save the values for salt dosage, cycle times, batch capacity, and total capacity, and proceed to the next item in the programming menu.

**If 'NO' is chosen**, then the programmer will have the ability to set each value as desired for salt dosage, cycle times, batch capacity, and total capacity. (Choosing "NO" will cancel Efficiency Mode if it was active prior to this step)

In either case, pressing the "STATUS" key at this step will save into EEPROM the "temporarily stored" values of hardness type (if metric), hardness, iron, salt type, and efficiency mode. These values are temporarily stored until this point in the event of a programming mode timeout. If a timeout does occur before the 'dEFLtS' setting is saved, then these "temporarily stored" values shall not change what was previously saved in EEPROM.

- **View** - This setting is used to allow the programmer to view the calculated and looked up values for salt dosage, cycle times, batch capacity, and total capacity. These values may only be viewed and can't be changed at this time. This 'View' programming item is only available in the menu if 'dEFLtS' was set to 'YES'. The display will show "VIEW N". The "Y" or "N" will be toggled with the "+" and "-" keys. The default for this item shall always be "N" and does not get saved in EEPROM. The programmer must always toggle to "Y" in order to view these items.

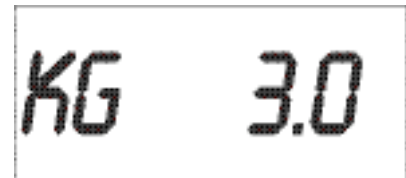


**If "Y" is chosen**, then pressing the "STATUS" key will display the value for salt dosage; repeated presses of the status key will display cycle times, batch capacity, and total capacity.

Pressing the "STATUS" key after viewing "Maxcap" will exit the programming menu..

**If "N" is chosen**, then pressing the "STATUS" key will exit the programming menu.

- **Salt Dosage** - This setting is used to set the salt dosage. It will only be accessible to be set if dips#3&4 are set to Gold or Platinum and 'dEFLtS' was set to 'NO'. The display will first show "dOSAGE" for two seconds and then display the default (or previously programmed value). The proper units (lbs or kg) will appear according to dip#7 setting (English/Metric). Adjust the salt dosage with the "+" or "-" keys.



**Note:** This setting also appears during Aqua-Sensor® Programming.

Pressing the "STATUS" key will save the setting and move to the next programming step.

- **Cycle 1 Time** - This setting is used to program the cycle 1 time that is usually backwash. The time of the cycle is kept in minutes. The display will show the "BACKWASH" and "MINS" icons and the cycle time in the right most digits.

**Note:** This setting also appears during Aqua-Sensor® Programming.

Adjust the value with the "+" or "-" keys.

Pressing the "Status" key will save the setting and move to the next programming step.



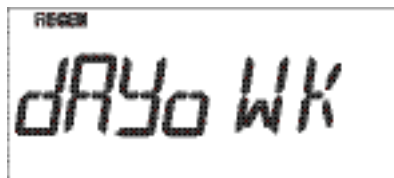
- **Cycle 2 Time** - This setting is used to set the time in minutes for cycle 2. This cycle is brine draw / slow rinse for softeners. The display will show the "BRINE RINSE" and "MINS" icons and the cycle time in the right most digits. Adjust the value with the "+" or "-" keys.

**Note:** This setting also appears during Aqua-Sensor® Programming.

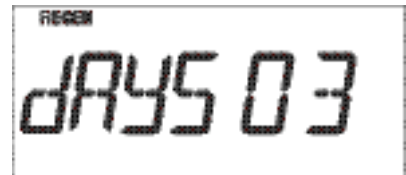
Pressing the "Status" key will save the setting and move to the next programming step.



- **Day(s) of Week Regeneration** - In the time clock mode only (Meter or Aqua-Sensor® not connected), the following optional days of the week setting will be available to trigger regeneration. The display will show "dAYoWK" for 2 seconds followed by "NO". The "+" or "-" key will toggle "yes" or "no" (default is NO). A "yes" response will indicate that the control is to perform a regeneration on specific days of the week.



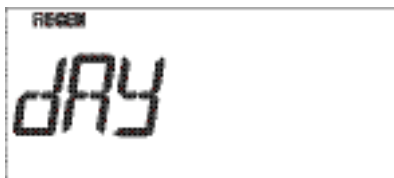
Pressing "STATUS" will save and advance to the next step. If "NO" was chosen, then the control will only initiate regenerations based upon the interval (in number of days) and the display will show as shown in Regeneration Interval above.





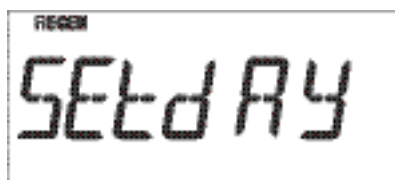
If **"YES"** was chosen, then the specific days of the week to regenerate will be selected as follows:

The display will show "dAY" for two seconds followed by "SUN N". The "regen" key toggles the days of the week and the "+" and "-" keys toggle "Y or N".



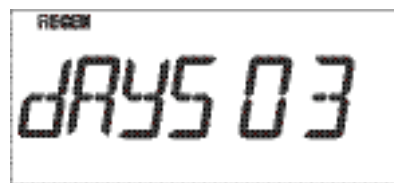
Pressing the "STATUS" key saves and advances to the next step.

If any of the days were set to "yes", the display will show "SETdAY" followed by "SUN". This selects the current day of the week. The "+" or "-" key toggles through the days of the week and pressing the "STATUS" key saves the setting and advances to the next programming step.



If ALL of the days were set to "no", then specific day of week regens will be canceled and will appear as shown in Regeneration Interval above, and the interval will be set in number of days.

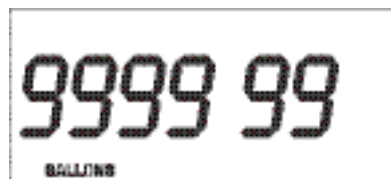
Pressing the "STATUS" key saves the setting and advances to the next programming step.



**Note:**

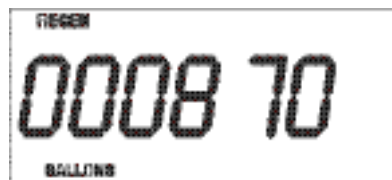
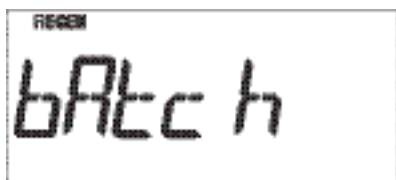
1. If any day of the week is set to "yes", the regeneration interval in number of days ("Days 03") will no longer appear when going through the programming menu at a later time. To go back from specific day of week regeneration to interval in number of days, choose "NO" at "dAYoWK".
2. If a DIP switch is changed anytime (other than run/test dip#1) after the control has been programmed to regenerate on any specific day, all settings will revert back to default ("dAYoWK" = NO); specific days to regenerate and current day will have to be reprogrammed.

- **Total Capacity Set Point (Max Capacity)** - This setting is used to program a value that corresponds to the maximum capacity that can be expected from a unit before it is completely exhausted. If the unit reaches this set point an immediate regeneration will occur even if the control is set to delay mode. This setting will only appear if a flow meter is connected to the circuit board and if dips#3&4 are set to Gold or Platinum with 'dEFLtS' set to 'NO'. Adjust the value with the "+" or "-" keys. The display will show the "REGEN" icon and "MAXCAP" for two seconds and then display the "REGEN" and "GALLONS" or "LITERS" (depending on DIP switch #7 setting) icons and the setting numbers to adjust.



Pressing the "Status" key will save the setting and move to the next programming step.

- **Batch Set Point** - This setting is used to set the trip point for regeneration when in flow meter operation. It will only appear if a flow meter is connected, dips#3&4 are set to Gold or Platinum with 'dEFLtS' set to 'NO', or dips#3&4 set to 'other'. The programmed setting displays the actual set point to trigger regeneration. The display will show the "REGEN" icon and "CAP" for two seconds and then display the "REGEN" and "GALLONS" or "LITERS" (depending on dip#7 setting) icons and the setting numbers to adjust. Adjust the value with the "+" or "-" keys.



Pressing the "Status" key will save the setting and exit the programming menu.

- **Screen Locking** - The screen locking can be toggled off and on by pressing the "+" and "-" keys simultaneously for 5 seconds while in the regular time of day display in standard service mode. The display will show "UNLOCK" or "LOCK" depending on the last setting. Toggle the screen with the "+" or "-" keys. When the screen is locked the only program menus that can be changed are 'beeper', TOD, and TOR. The other menus will appear as normal but their values will not be able to be changed.



Pressing the "Status" key will return to the regular time of day display in standard service mode.

### Programming Mode Timeout

If no key activity occurs for a period of 180 seconds (3 minutes) while in programming mode, the mode will time out, exit the programming mode and return to time of day display. Any setting that wasn't saved by pressing the 'status' key prior to the control timing out will revert back to the original value. (For flow meter mode, with dips#3&4 set to Gold or Platinum, the few settings that had temporarily stored values will revert back to their previous setting UNLESS the 'status' key was pressed at the 'dEFLtS' display.)

### Regen Time Remaining

Upon exiting the programming menu, the current time or day should be displayed on the servicing display. If the unit is in regeneration while in the service display, pressing the "REGEN" key will display how much total regeneration time remains. The display will stay active until the "REGEN" key is pressed again, or the regeneration ends (In Aqua-Sensor® mode, the total regeneration time remaining includes the full brine rinse time, but will adjust accordingly upon auto rinse out).

### Statistic Functions

While in the statistic functions all keys are active. The statistical functions are reached by pressing the "Statistics" key. The statistics will have two operational modes; a standard statistics mode and a service statistics mode. Repetitive presses of the "Statistics" key will cycle through the standard statistics mode until cycled back to time of day display. The service mode statistics will be entered by an initial key press of the "Statistics" key and then successive presses of the "-" key. While in the service mode statistics, the functions will repeatedly cycle through the menus until the "Statistics" key is pressed again. The following table outlines the statistic function display, range limits and default setting:

Display	Range Limits	Comments
Time Clock (Standard Statistic)	N/A	Display alternates between 'time' and 'clock' every second, until 'statistics' key is pressed or function times out. Pressing and holding the 'REGEN' key for 10 sec while in this display can access Auto Test Mode.
Aqua Sensor (Standard Statistic)	N/A	Display alternates between 'aqua' and 'sensor' every second, until 'statistics' key is pressed or function times out.
Flow Rate (Standard Statistic)	0 to 999.0	Based on "K" factor setting, updated a minimum of every 6 seconds (Only active with Flow Meter attached).
* Capacity Remaining (%) (Standard Statistic)	0 - 100%	% of capacity remaining based on the batch set point and the volume of water that has passed through the flow meter (Only active with Flow Meter attached)
* Capacity Remaining (gal/L) (Service Statistic)	0 - 999,999	Remaining gallons (liters) until capacity is reached (valid for Service statistics when flow meter is attached)
* Filter Media Life Remaining (Service Statistic)	0 - 999,999	-ONLY active in filter mode with 'Life' option set to 'Y'. -Remaining gallons (liters) until 'total flow for life of unit' reaches the value of 'total capacity set point', indicating the end of the filter media life
* Total Flow/Life Unit (Service Statistic)	1 - 999,999	Only active with Flow Meter attached
* Today's Water Usage	0 - 9999	Water usage from 12:00AM - 11:59PM
* Avg. Daily Water Usage	0 - 9999	Average Daily Water Usage over the last 7 Days
* Number of Regens - Last 14 days (Service Statistic)	0 to 99	-Days counter is to be updated at 12:00 AM ONLY when dip#6 is on AND dip#10 is off; Otherwise, update at whatever TOR is set for. -Number of Regens is to be updated after regen is complete
* Number of days since last Regen (Service Statistic)	0 to 99	-Days counter is to be updated at 12:00 AM ONLY when dip#6 is on AND dip#10 is off; Otherwise, update at whatever TOR is set for. -After a regen is complete, the counter is to be reset to 0
* Number of Regens - Life of the Unit (Service Statistic)	0 to 999,999	Counter is to be updated after completion of regeneration cycle
* Last slow rinse time (Service Statistic)	0 to 99	Only active if Aqua-Sensor® is attached

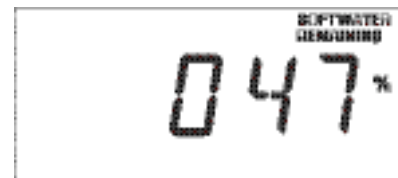
\* To be saved in EEPROM before the control is powered down during a power outage.

Once either of the statistics menus is entered the information shown for each display is outlined below:

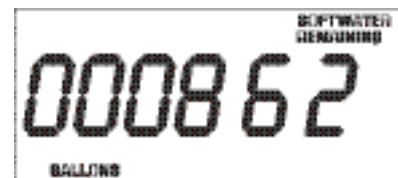
- **Time Clock (standard statistics)** - This display will only show when in time clock mode (no meter or aqua sensor attached). The display will alternate between 'time' and 'clock' every second until the 'statistics key' is pressed or until the function times out.
- **Aqua Sensor (standard statistics)** - This display will only show when in aqua sensor mode (no meter attached). The display will alternate between 'aqua' and 'sensor' every second until the 'statistics' key is pressed or until the function times out.
- **Flow Rate (standard statistics)** - This display will only show if the flow meter is attached to the control. The display shall show the current flow rate of the water passing through the control. The display will show the "FLOW RATE" and "GPM" or "LPM" icons and the current flow rate passing through the flow meter for as long as the "-" key or "Statistics" key is not pressed.

This display shall never time out, as opposed to the rest of standard statistics (10 minutes).

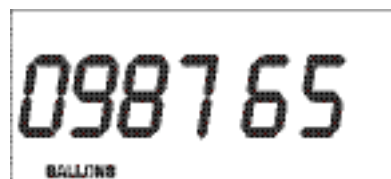
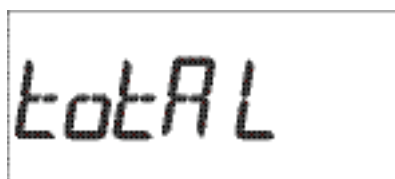
- **Capacity Remaining (%) (standard statistics)** - This display will only show if the flow meter is attached to the control. The display shows the percent capacity remaining in the batch before regeneration will be triggered. The display will show the "SOFTWATER", "REMAINING" and "%" icons for softeners. This display shall never time out, as opposed to the rest of standard statistics (10 minutes).



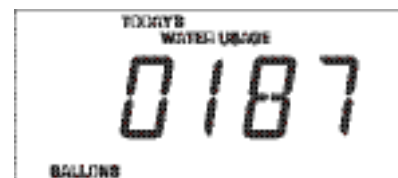
- **Capacity Remaining (gal/L) (service statistics)** - This display will only show if the flow meter is attached to the control. The display shows the gallons or liters of capacity remaining in the batch before regeneration will be triggered. The display will show the "SOFTWATER", "REMAINING", and "GALLONS" or "LITERS" icons (depending on DIP Switch #7 setting) for softeners.



- **Total Flow/Life of Unit (service statistics)** - This display will only show if the flow meter is attached to the control. The display will show a flow totalizer. The total amount of flow that has passed through the unit since it was installed will be maintained. The display will first show "totAL" for 2 seconds and then display the "GALLONS" or "LITERS" icon (depending on dip#7 setting) and the totalizer value for 10 seconds. This 2 and 10 second cycle should repeat until the "Statistics" key or "-" key is pressed, or the statistics time out brings the display back to time of day. If in filter mode with 'LIFE' option set to 'Y', pressing and holding the "REGEN" key for 10 seconds at the previous display will reset this value back to zero.



- **Today's Water Usage (standard statistics)** - This display will only show if the flow meter is attached to the control. The display will show the accumulated flow of water for the current day. The value is to start totaling at 12:00 AM and reset to 0 at 11:59:59 PM. The display will show the "TODAY'S", "WATER USAGE" and "GALLONS" or "LITERS" icons (depending on dip#7 setting) and the total days flow based on the "K" factor and number of pulses received from the flow meter.



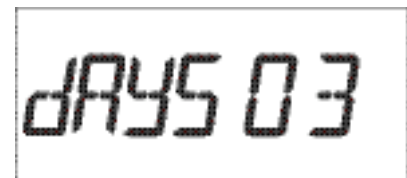
- **Average Daily Water Usage (standard statistics)** - This display will only show if the flow meter is attached to the control. The display will show a running 7-day average of daily water usage. The display will show the "AVG DAILY", "WATER USAGE" and "GALLONS" or "LITERS" (depending on dip#7 setting) icons and the averaged flow value.



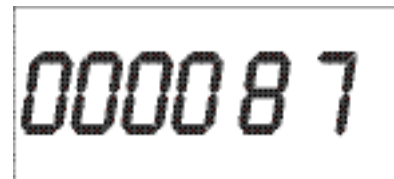
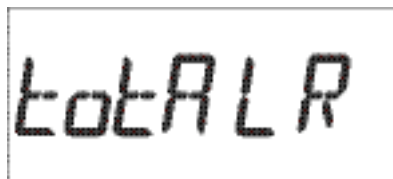
- **Number of Regenerations in Last 14 Days (service statistics)** - This display will show the number of regenerations that have occurred in the last 14 days. The display will first show "14dAY" for two seconds and then display the number of regenerations that have occurred.



- **Number of Days since Last Regeneration (service statistics)** - This display shows the number of days that have elapsed since the last regeneration. The display will show "DAYS XX" where XX is the number of days that have elapsed since the unit completed its last regeneration.



- **Total Number of Regenerations for Life of Unit (service statistics)** - This display will show the total number of regenerations that have occurred since installation. The display will show "totALR" for two seconds and then display the total number of regenerations.



- **Last Slow Rinse Time (service statistics)** - This display will appear only if an aqua sensor is attached. The duration of the most recent brine rinse cycle time should be displayed. This time should be displayed (and saved in EEPROM) regardless of how the cycle ended; whether it ended by the auto rinse out feature, by advancing out of the cycle manually, or by the cycle timing out. The display will show the "MINS", "BRINE RINSE" icons and "LAST XX" where XX would be the time in minutes of the last slow rinse cycle. 'ALARM 1' code can be cleared while in this display by pressing and holding the 'regen' key for 10 seconds.



# Manual Cycling

## Statistical Function Timeout

If no key activity occurs for a period of 600 seconds (10 minutes) while in statistic functions mode, the mode will time out and return to the time of day display. An exception is that the flow rate and % capacity remaining will not time out but will remain displayed until a key is pressed. Pressing the "Statistics" key after the last standard statistics display will return the unit back to the time display.

## Manual Control Cycling

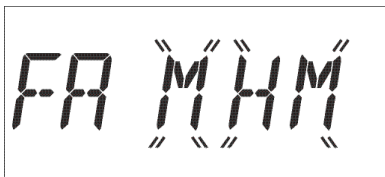
The control can be manually cycled through a regeneration to troubleshoot the control or verify that the set-up is complete. When a control is manually cycled back to the service position, the statistical counters of capacity remaining, days since last regeneration, last slow rinse time and the number of regenerations in the last 14 days and the life of the unit are not to be reset or updated. If the control is allowed to time out from the last position back to service (Home), the applicable statistical counters are to be reset or updated. A manual cycling of the control can be accomplished by following the steps as outlined below.

1. While in the service mode, press the "Statistics" key.
2. Press the "+" key to display the current motor position.
3. Press and hold the "Regen" key for 3 seconds until the regeneration is started. Once regeneration is active, the "Regen" key will be ignored until the control returns to the service or "home" position.
4. The REGEN icon will flash and the motor will move the control to Backwash position.
5. Press the "+" key to cycle to the next position and remain there until the cycle times out or the control is manually indexed.
6. Continue to press the "+" key until the control returns to the service (Home) position. In order to step through the cycles again, repeat at step 3.

**Note:** If the "-" key is pressed at any time, the control will move back to the first item in the statistics menu. Pressing the "+" key from the statistics menu would move the display back to the current diagnostic cycle. The "+" key will be ignored once the control returns back to the home position.

## Home/Service

- To start manual cycling, press the STATISTICS key, then the "+" key
- In the Home position, the display will alternate between HM and 00
- Depending on operating mode - clock, meter or sensor - the left of the display will be blank, or an F (if flow meter attached) or an A (if Aqua-Sensor® attached) will appear.
- The center digit is the regeneration trigger indicator (seeding notices section)



### Backwash

- Press and hold the REGEN key for 5 seconds; the control should move to the BACKWASH
- The cycle time remaining appears at the right of the display



### Brine Rinse

- Press the "+" key; the control should move to the BRINE RINSE position
- If a metered unit, the brine rinse time is determined by the model and tank size
- If a sensor, the brine rinse time defaults to 99 minutes
- If clock, defaults to 60 minutes



### 4-Cycle

- Press the s key
- If a 4-cycle control, it will move to the FAST RINSE/REFILL position; the time is determined by salt dosage



### Fast Rinse/Refill

- Press the "+" key
- The control will return to the Home position
- Press the "+" key to return to the Home position



**Note:** The regeneration indicator will display "F" (flow meter), "A" (Aqua-Sensor®), "t" (time clock) or "M" (manual). If the "REGEN" icon is lit, then the indicator stands for what mode indicated regeneration. If the "REGEN" icon is NOT lit, then the indicator stands for what triggered the last regeneration.

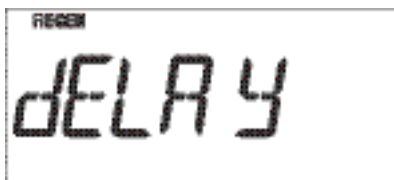
# Final Start-Up

## Regeneration

There are several conditions that will cause the control to trip a regeneration. The "REGEN" enunciator will light when the control has signaled for a regeneration. The "REGEN" enunciator will flash while the control is in regeneration. The following are conditions that will call for regeneration:

- 1 When the Soft-Minder® meter has recorded the passage of a predetermined number of gallons.
- 2 When the Aqua-Sensor® Probe senses the hardness in the Cullex Media.
- 3 At the preset time, when the number of days without a regeneration is equal to the Timeclock Backup setting.
- 4 At the preset time, when the "REGEN" button is depressed once. "REGEN" will light.
- 5 Immediately, when the "REGEN" button is depressed for three seconds. "REGEN" will light and blink.
- 6 Immediately, if power to the unit has been off for more than 3 hours and time of day has been restored.

An override function is to exist to allow for the control to initiate a delayed regeneration if DIP switch # 6 is set to 'delay'. To initiate the override function simultaneously press and hold the "+", "-" and "Statistics" keys for 3 seconds while in the service mode. The display will show the status of power up as "dELAY" or "IMME d" with "IMME d" being the default.



Toggle the setting with the "+" or "-" key and save the setting and exit by pressing the "Status" key. If set to delayed, then after a >3hr power outage the "regen" icon will light and the regeneration will begin when the timer reaches the next programmed time of regeneration. If set to immediate, the regeneration will begin as soon as the control completes the homing cycle.

If DIP switch 6 is set to "ON", the unit will begin a regeneration immediately for instances 1 and 2. With DIP switch 6 set to "OFF", the regeneration will not begin until the preset regeneration time.

**Note:** If set to immediate mode as timeclock or timeclock backup, the unit will initiate regeneration at 12:00 AM. In the delay mode, "REG" indicator will light at 12:00 AM and regeneration will occur at delayed time.

## Recommended Meter Start-Up Procedure

- Close the main water supply valve.
- Set the Cul-Flo-Valv® to the bypass position.
- Ensure that all faucets at the installation site are closed.
- Direct the drain line discharge into a bucket where flow can be observed.
- Plug the transformer into a 120 Volt, 60 Hz, single-phase receptacle.
- Wait for the control to energize the motor and home itself.
- Set the timer to the correct time of day.
- Open the main supply valve.
- Initiate an immediate regeneration to move the control into the backwash position.
- Refer to the section on manual cycling for information on cycling the control through its positions.
- When in the backwash position, slowly shift the bypass to the soft water position until water flows.
- Allow the tank to fill slowly until water flows from the drain line.
- When flow to drain is established, open the bypass fully. Watch the drain line discharge for signs of resin. If signs of resin particles appear, reduce the flow. Increase the flow again when resin no longer appears in the discharge.
- When the unit is filled with water, return the timer to the service position and proceed with setting the microprocessor. Refer to the programming section.



- When the unit is filled with water, return the timer to the service position and proceed with setting the microprocessor. Refer to the programming section.
- Sanitize the unit as you leave the installation site (See Sanitizing Procedure on page 41).

**Note:** *Unplugging the Culligan Gold Series™ water softener will not affect any of the control settings. Once programmed in, the settings will be stored indefinitely. In the event of a power failure the time-of-day setting will be stored for 1-2 hours. If longer time storage is necessary, a battery backup is available.*

## Recommended Aqua-Sensor® Start-Up Procedure

Listed below are recommendations on how to reduce the occurrence of alarms and consecutive regenerations on new installations using Aqua-Sensor® sensing device.

**Note:** *You may find it useful to pre-test the sensor probe in your shop using the test detailed in the section titled “Sensor Probe Resin Test.” The same test setup can be used in the field.*

- Close the main water supply valve.
- Install the sensor probe into the tank but do not connect the sensor to the control at this time.
- Set the Cul-Flo-Valv® to the bypass position.
- Ensure that all faucets at the installation site are closed.
- Direct the drain line discharge into a bucket where flow can be observed.
- Plug the transformer into a 120 Volt, 60 Hz, single-phase receptacle.
- Wait for the control to energize the motor and home itself.
- Open the main supply valve.
- Initiate an immediate regeneration to move the control into the backwash position.
- Refer to the section on manual cycling for information on cycling the control through its positions.
- When in the backwash position, **slowly** shift the bypass to the soft water position until water flows.
- Continue backwash until the drain effluent is clear – at least 10 minutes (use a white foam coffee cup to occasionally collect a sample of backwash water; the stark white of the cup will show the presence of color throw and resin fines)
- Continue or repeat the backwash cycle if needed (while in the backwash step, you can pull the plug on the control and allow it to run as long as needed)
- After the backwash water runs clear, step the control to the Fast Rinse/Refill position to fill the brine tank and purge air from the brine line
- Continue or repeat the backwash cycle if needed (while in the backwash step, you can pull the plug on the control and allow it to run as long as needed)
- Unplug the control and connect the sensor to the circuit board
- Reconnect the power; the control will home again
- To check the condition of the sensor, press the STATISTICS key, followed by the + key (the screen at right appears, HM alternating with the time remaining in the sensor lockout period – should be 00); with a sensor connected the A enunciator should appear
- The A enunciator should be steady, signifying balance; if balanced, skip the next 2 steps.
- If the A enunciator is flashing, the probe may not have settled completely into the tank; resume backwashing for an additional 10 minutes.
- If the A enunciator is still flashing, and the probe has passed the Sensor Resin Test (see the following section), it may be one of the more sensitive probe assemblies. You may use it as-is or replace it with a less sensitive probe.
- Press the STATUS key and program the control to the desired settings.
- Complete installation and cleanup;
- Sanitize the unit as you leave the installation (see sanitizing procedure on page 41).

The thorough backwashing process should have cleared the fines and color-throw from the tank. The probe should settle into the resin bed during the first couple of minutes of backwashing.

Consecutive regenerations may occur for several days if the probe is particularly sensitive. Advise the customer that this may happen and follow up in a week's time.

# Operation, Care & Maintenance

## Before Leaving The Installation Site

- **Sanitize the water softener.** See sanitizing procedure on page 41.
- **Ensure that the brine tank has water** to the level of the float. Add water to the tank with a hose or put the unit into a full recharge so that the brine refill cycle will fill the tank with the proper amount of water.
- **The water heater will hold hard water for several days.** Advise the customer that the existing water volume in the tank will need to be used before the hot water is soft. If soft hot water is required immediately, refer to the water heater owner's manual for the proper method of draining the water heater.
- **Explain the operation of the softener to the customer.** Make sure the customer knows that there will be new sounds associated with the recharging of the unit. Advise the customer to periodically check and replenish the salt supply.
- **Fill in the hardness and number of people,** and then sign and date the corresponding performance data sheet. Leave the Owner's Guide with the customer.
- **Attach the appropriate data plate label** located in the Parts Pack onto the back of the control.
- **Clean up the unit and installation site,** removing any soldering, or pipe threading, residues from the equipment and surrounding area with a damp towel.

## Use of Bypass Valve

Depending on where the particular installation was made, the outside sill cocks may or may not be served by conditioned water. Ideally, all lines not requiring soft water should be taken off upstream of the softener. This is not always possible, however, due to the difficulty or expense of rearranging the piping.

Bypass the softener if:

1. The outside lines do not bypass the water softener and the water is to be used for lawn sprinkling or other outside uses.
2. Water is not used for several days.
3. You wish to inspect or work on the valve or brine system.
4. A water leak from the valve is evident.

## Three-Valve Bypass

To bypass, close the inlet and outlet valves, and open the bypass valve. Reverse the process to get soft water once again. Be sure to close the bypass valve completely to avoid mixing hard water with soft water.



**CAUTION!** If the media tank is to remain attached to the control valve, close only the inlet valve, then open the bypass valve. This will prevent pressure from increasing in the media tank due to warming.

## Care and Cleaning

Protect the operation and appearance of the water conditioner by following these precautions:

1. Do not place heavy objects on top of the conditioner cover.
2. Use only mild soap and warm water to clean the exterior of the unit. Never use harsh abrasive cleaners or compounds which contain acid or bleach.
3. Protect the conditioner and drain line from freezing temperatures.
4. Reset the time, if required, after any interruption of electrical power to keep the unit on its normal schedule.

# Recommended Preventative Maintenance

## Sanitizing Procedure

A water softener in daily use on a potable water supply generally requires no special attention other than keeping the salt tank filled. Occasionally, however, a unit may require sanitization under one of the following conditions:

- At start-up time.
- After standing idle for a week or more.
- On private supplies, the appearance of off-tastes and odors, particularly if musty or "rotten egg" (caused by harmless sulfate-reducing bacteria).

**Note:** *If the water supply contains iron, regenerate the softener before sanitizing to remove iron from the resin.*



**CAUTION!** Hazard from toxic fumes! Chlorine bleach and common iron control chemicals may generate toxic fumes when mixed.

- If the unit uses culligan sofner-gard® or other compounds containing sodium hydrosulfite, sodium bisulfite, or any other reducing agent, disconnect the device feeding the chemical(s) and manually regenerate the unit before sanitizing.
- Do not use this procedure if the softener salt contains iron control additives.

1. Remove the brine tank cover.
2. Pour directly into the brine chamber 1/3 to 1/2 cup of common household bleach (5.25% sodium hypochlorite) for each cubic foot of resin in the tank.
3. Manually start recharge. Allow the unit to complete the recharge cycle automatically.

If tastes and odors return frequently, even after sanitization, a continuous chlorination system may be needed. Send a water sample to a qualified laboratory for bacterial analysis.

## Analyzing the System

Analyzing the problem involves three basic steps:

1. Check the system in all cycle positions.
2. Compare the data to normal operating data.
3. Determine which component may cause the problem (troubleshooting).
4. If steps 1-3 did not reveal the problem, initiate a regeneration cycle and manually cycle the valve to brine draw (#2 position). Allow the unit to complete the brine draw cycle and observe how the system reacts.

Although it may be possible to solve a specific problem simply by changing a component, analyzing the entire system can reveal additional problems which would otherwise require extra service calls. "Parts changing" is not the same as service.

## Check the System

The following tools are needed to collect data:

1. Hardness, iron and chlorine test kits
2. Thermometer
3. Pressure gauge, 0-120 psi
4. 5-Gallon bucket and watch
5. Calculator

The customer can provide most data. By collecting data prior to a service call, a "first guess" about the cause of the problem can be made and the need for any special parts can be determined. If the problem is as simple as lack of salt in the brine tank, a service call may not be needed at all. At the end of Appendix A is a recommended system data sheet that will assist the troubleshoot process.

## Application Problems

Many service problems are not due to equipment malfunction, but rather to misapplication or environmental conditions.

**The Operation & Performance Specifications** (page 3 of this manual) provides the limits of water characteristics for the Culligan Gold Series™ water softeners. If the water characteristics fall outside these limits, additional water treatment equipment may be required, or the water characteristics should be brought inside the limits. The system flow rates and exchange capacities are also listed.

**Appendix A, Table 4 - Flow Rates.** The backwash, brine, and slow rinse flows should not differ from those in Appendix A, Table 3 - Flow Rates by more than 15%.

**Appendix A, Table 5 - Salt Dosage/Capacity** shows the gallon capabilities for each unit as a function of salt dosage. If the hardness or water usage has increased, a higher salt dosage, more frequent regeneration, or a larger softener may be needed.

**NOTE:** The rate at which brine is drawn from the brine tank should not differ by more than 5%. The refill rate should be as close as possible to the rate shown in Appendix A, Table 4 - Flow Rates; high or low pressure installations may require the substitution of a different refill flow control.

If there are no apparent general problems or environmental problems, refer to pages 46 - 53.

## Recommended Preventative Maintenance Inspection Schedule

The Culligan Gold Series™ commercial water softener has been designed to provide a good, consistent service life. Routinely inspecting the system may help avoid potentially costly breakdowns related to circumstances outside of the control of the dealer and/or user.

Component	Suggested Inspection Frequency	Reason for Maintenance
Entire System	At Start-up, after infrequent use (idle for one week or more) or every 3 - 6 months if on a private water supply.	On private supplies, the appearance of off-tastes and odors, particularly if musty or "rotten egg" (caused by harmless sulfate-reducing bacteria) may indicate a need for the system to be sanitized. See page 39.
Backwash Flow Controller	Every 12 months or every time service is performed on the system.	Build up of sediment, iron and/or other foreign materials (found in some water supplies but not necessarily all) could negatively affect system performance. Monitor item for normal or unexpected wear.
Brine eductor nozzle and throat	Every 12 months or every time service is performed on the system.	Build up of sediment, iron and/or other foreign materials (found in some water supplies but not necessarily all) could negatively affect system performance. Monitor item for normal or unexpected wear.
Softening Media	Every 2 - 3 years	Chlorinated water supplies can breakdown and destroy resin material. Resin material may also perform poorly if subjected to other materials (sediment, iron, alum, etc.) found in some water supplies (but not necessarily all).

Table 7

# Error Codes

## Error & Alarm Mode

When a failure is detected, the control will generate and display an error or alarm code with audible beeps, depending on the type of failure, as shown in the table below.

In order to clear an error code (after correcting the problem), push and hold the "Status" key for 10 seconds. After the 10 seconds, the control will clear the error code, beep once, and cycle the valve to service (Home). Other methods of clearing the error code are: powering down the control for 60 seconds, toggling a DIP switch or changing an input connection (adding or removing an Aqua-Sensor® or Flow Meter). If the problem is still present after clearing the error code, the error code will again be displayed. While in error mode, the control will not function. When returning from Error mode, the control shall use the values stored in EEPROM unless a DIP switch was toggled or an input connection (Aqua Sensor, Flow meter, Chlorinator) was changed. In those cases, the programmed values shall revert back to the defaults.

The alarm codes are cleared differently depending on which failure is detected. The alarm codes pertain to 'Auto Rinse Out Failure Alarm' (MISSED RINSE) can be enabled or disabled. To enable MISSED RINSE, the brine rinse time must be set to 99 minutes. If set for 98 minutes or less, the alarm is disabled. The table below describes how to clear these alarms. After clearing an alarm code, the control should beep once, but the valve should not home itself.

**Note:** All error and alarm codes will only sound between 8:00 am and 8:00 pm (08:00 - 20:00). Pressing a button will silence the audible signal for that day only.

Display	Error Description	Mode of Detection	Clearing Error/Alarm
<b>ERR 1</b>	Motor Failure to Start	If the valve fails to reach the desired state within 70 seconds of driving the motor. The control will attempt to start the motor 3 times for 70 seconds each time with a 60 second off period between each attempt.	Press and hold 'STATUS' key for 10 seconds.
<b>ERR 2</b>	Motor Failure to Stop	If the control detects changes in the Cam inputs when the motor is not supposed to be turning.	Press and hold 'STATUS' key for 10 seconds.
<b>ERR 3</b>	Incorrect Cycle Position	The control expects to be in a different position than that indicated by the Cam switch closures.	Press and hold 'STATUS' key for 10 seconds.
<b>ERR 4</b>	Dips # 3 & 4 (Control Selection) Do Not Match the Valve Detected	-If dips#3&4 are set for 'Platinum' and 4-cycle valve is detected. -If dips#3&4 are set for 'Gold' and 5-cycle valve is detected.	Press and hold 'STATUS' key for 10 seconds.
<b>MISSED RINSE</b>	Auto Rinse Out Failure	If brine rinse time was not cut short by Auto Rinse Out and lasted 99 minutes. Alarm occurs after regen is complete.	Press and hold the 'REGEN' key for 10 seconds while in Service Statistics Mode at the 'Last Slow Rinse Time' display OR the alarm clears automatically if the next brine rinse cycle is successfully cut short by Auto Rinse Out.

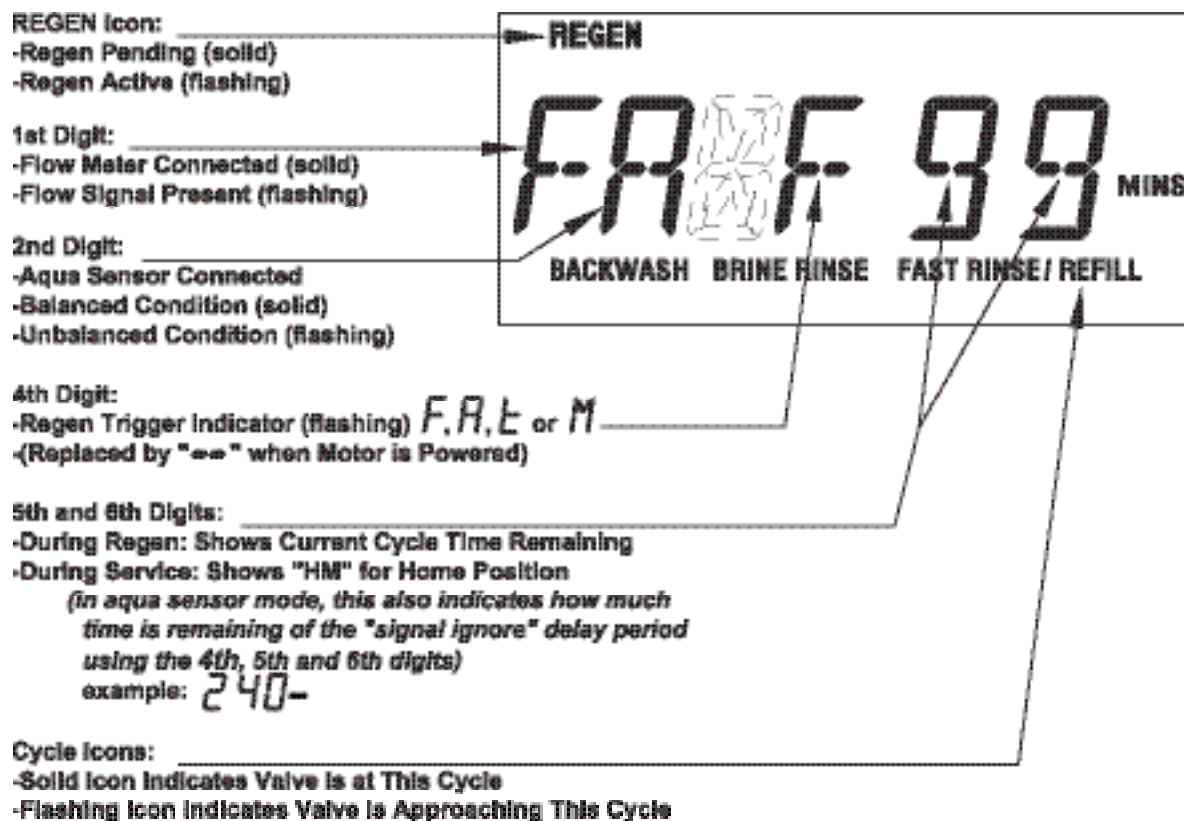
# Diagnostics

## Diagnostic Functions

While in the diagnostic functions mode all keys will be active. The mode is entered by pressing the "Statistics" key, then the "+" key. These functions are used to perform diagnostics on the control during regen. The display shows the "REGEN" icon solid (if a regen is pending) or flashing (if in regen). The display is to show Current Cycle along the bottom (4-cycle valve: Backwash, Brine Rinse, Fast Rinse/Refill; 5-cycle valve: Backwash, Brine Rinse, Fast Rinse, Refill). The status of the motor output is to be shown in the 3rd digit from the right. The center bar of the digit will light for the motor being powered. The cycle time remaining will be displayed in the two rightmost end digits along with the "MINS" icon. When in home position, the two rightmost digits will alternate displaying "HM" (with "MINS" icon off), and time remaining (with "MINS" icon on); 2 seconds each. If an aqua sensor is connected, the 240-minute stabilization delay time will be displayed here after a regeneration (only if regeneration is allowed to be completed on its own). If a flow meter is attached, the far left digit will show "F" solid, and flash if the control is getting a flow signal from the flow meter. If an aqua sensor is attached, the second digit from the left will show "A". The "A" will be solid for a balanced condition, and flash for an unbalanced condition. A typical display for this function is shown below.

## Last Regeneration Trigger

The fourth digit from the left can be "F" (Flow Meter), "A" (Aqua-Sensor®), "t" (time clock) or "M" (Manual). If the "REGEN" icon is off, this letter stands for what triggered the last regeneration.



## Test Mode

In this mode the control can be put through a performance test to verify the operation of the board components. Moving dip#1 from service to test mode enters the test mode. When entering test mode all program settings and statistical data will be stored in EEPROM. The test sequence is to follow the description as found in the table below. Upon exiting test mode, if a device connection is different (flow meter or Aqua-Sensor® connected or disconnected) or a DIP switch setting is changed from the condition that was present when entering test mode, the control will behave as if the change was made while out of test mode. For example, if a flow meter was added and not removed while in test mode, the control shall load the flow meter defaults when exiting test mode.

Test Description	Display Information	Action Trigger
Start Test Mode	All LCD segments lit	DIP switch #1 set to on, all others off
Software version	Software version # or "ERRSUM" if code is corrupt	Press a key after entering test mode as above
Enter test mode	Blank Display	Press a key after displaying the software version #.
DIP switch #2	Display to show "2"	Turn on DIP Switch # 2
	Display to Blank	Turn off DIP switch #2
DIP switch #3	Display to show "3"	Turn on DIP Switch # 3
	Display to Blank	Turn off DIP switch #3
DIP switch #4	Display to show "4"	Turn on DIP Switch # 4
	Display to Blank	Turn off DIP switch #4
DIP switch #5	Display to show "5"	Turn on DIP Switch # 5
	Display to Blank	Turn off DIP switch #5
DIP switch #6	Display to show "6"	Turn on DIP Switch # 6
	Display to Blank	Turn off DIP switch #6
DIP switch #7	Display to show "7"	Turn on DIP Switch # 7
	Display to Blank	Turn off DIP switch #7
DIP switch #8	Display to show "8"	Turn on DIP Switch # 8
	Display to Blank	Turn off DIP switch #8
DIP switch #9	Display to show "9"	Turn on DIP Switch # 9
	Display to Blank	Turn off DIP switch #9
DIP switch #10	Display to show "10"	Turn on DIP switch #10
	Display to Blank	Turn off DIP switch #10
Status Key	Display to show "11" and motor to run for 15 seconds	Press Status key
+ Key	Display to show "12"	Press + key
- Key	Display to show "13"	Press - key
Regen Key	Display to show "14"	Press Regen key
Statistics Key	Display to show "15" or "EE" if EEPROM is bad	Press Statistics key
Home Switch	Display to show "H" when Home switch closed	Close Home Switch
	Display to Blank when open	Open Home Switch
Position Switch	Display to show "P" when position switch closed	Close Position Switch
	Display to Blank when open	Open Position Switch
Flow Meter	Display to show "GPM" icon when flow meter is connected	Connect Flow Meter
	Display to blink "GPM" icon when meter is sending pulses	Spin Flow Meter
Aqua-Sensor®	Display to show "REGEN" icon when Aqua-Sensor® is connected & balanced	Connect & Balance Aqua-Sensor®
	Display to blink "REGEN" icon when unbalanced signal received	Unbalance Aqua-Sensor®

When exiting test mode, if the dip switches or sensors have not changed, the control is to restore all values from EEPROM. If the dip switch or sensors have changed the values should reset to factory defaults. In either case the valve will home itself.

# Troubleshooting

## Troubleshooting Guide

Problem or Symptom	Cause	Solution
1. Unit has blank display.	A. Unit has no power.	A. Verify that unit is connected to a constant power source (Not an outlet on a switch).
	B. Defective plug-in transformer.	B. Replace plug-in transformer.
2. Softener fails to automatically initiate a regeneration.	A. Electrical service to the unit has been disrupted.	A. Verify that unit is connected to a constant power source (Not an outlet on a switch).
	B. Soft-Minder® meter not properly recording total gallons used. The flow meter connection and operation can be verified using the test mode setting on the circuit board.	B. Verify that meter cable is plugged into circuit board. Verify that meter cable is snapped into flow meter housing. Verify that flow meter has not become plugged with debris.
	C. Aqua-Sensor® probe not sensing hardness front. The Aqua-Sensor® connection and operation can be verified using the test mode setting on the circuit board.	C. Verify that Aqua-Sensor® connector is properly connected to circuit board and 2.5VAC is properly connected to circuit board. Verify that Aqua-Sensor® probe is working. Clean probe if necessary.
	D. Incorrect programming.	D. Refer to the 'Programming' section and verify all settings.
3. Regeneration occurs at incorrect time.	A. Timer setting incorrect.	A. Reset timer.
	B. Timer flashing.	B. Reset timer and verify that unit is connected to a constant power source.
	C. Circuit board set to immediate regeneration.	C. Set circuit board to delayed regeneration by flipping dip switch 6 to the OFF position.
	D. Incorrect programming.	D. Refer to the 'Programming' section and verify all settings.
4. Error message is displayed.	A. Jammed seal pack or brine piston (ERR 1).	A. Replace the seal pack or brine piston
	B. Defective cam microswitches (ERR 1, ERR 2, or ERR 3).	B. Replace cam microswitches.
	C. Defective drive motor (ERR 1).	C. Replace the drive motor.



## Troubleshooting Guide – Continued

Problem or Symptom	Cause	Solution
5. Hard water to service. The root cause of hard water to service may also lead to problems such as Iron or Hardness bleed in softener.	A. Salt or Chemical storage tank is empty.	A. Add salt or chemical to storage tank and verify that proper level of salt or chemical is maintained.
	B. Eductor screen or nozzle plugged.	B. Clean or replace eductor nozzle and/or screen.
	C. Incorrect programming (Salt dosage too low for influent hardness).	C. Refer to the 'Programming' section and verify that settings are correct.
	D. Insufficient water flowing to salt storage tank.	D. Verify that refill settings are correct and clean the refill flow restrictor.
	E. Internal seal leak.	E. Replace seal pack.
	F. Excessive water usage.	F. Verify that programming is correct. For Time Clock units increase regeneration frequency.
	G. Unconditioned water in water heater tank.	G. Flush water heater to fill tank with conditioned water.
6. Loss of water pressure	A. Control and/or resin bed plugged with debris or iron build-up.	A. Clean control and increase frequency of regenerations or length of backwash. Plant recondition if necessary.
	B. Inlet manifold plugged.	B. Remove control from tank and clean inlet manifold. Check if eductor screen/nozzle are also plugged.
	C. Control plugged with foreign material broken loose from recent plumbing work.	C. Clean control.
7. Loss of mineral to drain.	A. Improper drain line flow control.	A. Ensure that the control has the proper drain line flow control (see Table 3, page 21).
	B. Air in water system.	B. Ensure that brine is working properly.
8. Mineral to service.	A. Control connected to tank backwards.	A. Verify that control is properly mounted to the tank.
	B. Defective outlet manifold.	B. Replace outlet manifold.
9. Water in storage tank up to float.	A. Plugged drain line flow control (Unit will not draw brine).	A. Clean drain line flow control.
	B. Plugged eductor system (Unit will not draw brine).	B. Clean eductor screen and nozzle.
	C. Slow leak to brine line. Faulty eductor piston.	C. Replace eductor piston.
	D. Power outage while control was in refill position.	D. Verify that items A-C are not the cause for the extra water in the storage tank.

## Troubleshooting Guide – Continued

Problem or Symptom	Cause	Solution
10. Excessive water in salt storage tank (Water above brine valve float).	A. Faulty brine valve; float shut-off failure. When the brine valve is faulty, one of the items listed under problem 9 is also required in order to produce excessive water in the storage tank.	A. Clean brine valve, replace stem seat, or replace brine valve.
11. Unit fails to refill storage tank.	A. Refill restrictor plugged.	A. Clean or replace refill restrictor.
	B. Air in brine line causes float to slam shut (float rod is rigid).	B. Verify that all tubing connections are properly assembled.
12. Unit fails to draw brine or chemical.	A. Drain line flow control is plugged.	A. Clean drain line flow control.
	B. Plugged eductor system.	B. Clean or replace eductor screen or nozzle.
	C. Line pressure too low.	C. Increase line pressure to a minimum of 20 psi (210 kPa).
	D. Internal control leak.	D. Replace seal pack and/or eductor piston assembly.
	E. Drain line too long or restricted.	E. Verify proper drain line length. See 'Flow Rate and Drain Line Charts'.
	F. Eductor is drawing air into system.	F. Verify that all tubing connections are properly assembled.
13. Unit uses an excessive amount of salt or chemical.	A. Incorrect programming.	A. Refer to 'Programming' section and verify all settings.
	B. Excessive water in storage tank.	B. Refer to problems 9 & 10.
14. Continuous flow to drain	A. Internal seal pack leak.	A. Replace seal pack.
	B. Seal pack or brine piston jammed in position.	B. Replace seal pack or brine piston.
	C. Power failure while unit was in regeneration.	C. Restore power to unit. Verify that unit is connected to a constant power source.
15. Salt water to service	A. Inadequate Brine/Rinse setting for desired salt dosage.	A. Refer to the 'Programming' section and verify all settings.
	B. Low water pressure lengthens brine draw time.	B. Increase line pressure to a minimum of 20 psi (210 kPa).
	C. Too much brine in the storage tank.	C. Refer to problems 9 & 10.

## Brine System Analysis

- |                                   |   |
|-----------------------------------|---|
| 1) WATER LEVEL in the brine tank  | 2) SAFETY VALVE in brine tank                                     |
| a) Empty                          | a) Fiberglass rod travels up and down freely (approximately 1/2") |
| b) Below level of safety valve    | b) Fiberglass rod is rigid  |
| c) At level of safety valve float |   |

If the brine system is functioning properly, there will be water in the brine tank, but the level should be below the safety valve float and the fiberglass rod should travel freely. If these conditions do not exist, one of the following conditions will indicate the nature of the problem:

1. NO WATER IN BRINE TANK – ROD TRAVELS FREELY. The flow control is plugged. Remove refill flow control. Clean or replace.
2. NO WATER IN BRINE TANK – ROD IS RIGID. Air or water slammed the safety valve closed before water could enter the tank. Clean parts at the base of the brine safety valve and also make sure that the seat of the check valve in the brine line is clean. Check for possible air leaks in the brining system.
3. WATER IN BRINE TANK UP TO SAFETY VALVE FLOAT – ROD IS RIGID. There are three possible causes:
  - a. Brine piston is not in service position when control is in service or brine piston seals are defective. Remove brine line while in service. There should be no flow to brine tank.
  - b. Refill flow rate is too high or refill time length is too long. Check refill flow rate and compare to specification in Appendix A, Table 3 - Flow Rates.

## Aqua-Sensor® Troubleshooting

The following procedure will help you diagnose problems in units equipped with Aqua-Sensor® sensing device. Because many "sensor problems" are actually regeneration problems, it contains a combination of sensor diagnostics and routine control valve and brine system checks. Refer to the Troubleshooting Flow chart on page 50 for the recommended sequence and Appendix B for suggested Aqua-Sensor® application guidelines.

## Circuit Board Test

1. Verify there is 2.5 VAC power supply at the Culligan Gold Series™ circuit board for the Aqua-Sensor®. (See Page 21)
2. Record program and DIP switch settings before beginning this procedure. Determine the slow rinse time of the last regeneration cycle from statistics menu.
3. Unplug the unit before changing any DIP switch positions.
4. Remove the Aqua-Sensor® cable from the board.
5. Move DIP switch(es) to Test Mode. DIP switch 1 ON, all others OFF
6. Connect Soft-Minder® Meter/Aqua-Sensor® Tester (P/N 01007705) to board. The color of the wire on the far right as you look at the back of the board should be white.
7. Move toggle to Balanced position.
8. Apply power; all segments should be lit on display.
9. Press any key. The software version should be displayed.
10. Press any key. Display should go blank except for solid regen icon (Balanced).
11. Toggle to unbalanced position. Regen icon should flash.
12. If regen icon does not flash when balanced and flashes when unbalanced, then the board is good.

### Optional Service Test

If you wish, you can also test the circuit board in the Service mode (DIP switches in the Service, rather than Test, position).

1. Unplug control.
2. Connect Soft-Minder Meter/Aqua-Sensor® Simulator (P/N 01007705) to the circuit board with the toggle in the balanced position.
3. Plug in the control.
4. In diagnostics display, "A" should flash when unbalanced and stay solid when balanced.
5. Move the Aqua-Sensor® Simulator toggle to the Unbalanced position. The circuit board should display a REGEN signal after a 6-minute delay.

### Sensor Probe Resin Test

The Probe Resin Test uses fully regenerated, but previously used, Cullex® resin to simulate a balanced environment. Run this test only on a circuit board that has passed the Circuit Board Test.

### Preparation

You will need a container that can hold enough regenerated Cullex resin to completely immerse the probe's electrodes without making contact with the container's sidewall. A section of PVC pipe, either 2" or 3", makes a suitable chamber for testing either residential or commercial probes.

1. Cut a piece of pipe about 18 inches long and close the bottom end with a cap or a flat piece of PVC (which can also serve as a base)
2. Close the other end with a cap that has been drilled and tapped for a 1" PVC pipe plug, or use a reducing adapter and plug.
3. Fill the chamber with used, regenerated Cullex resin and soft water; the water level should be at least one inch above the resin (when not in use, plug the end to prevent spillage of resin and water)

### Probe Test

1. Remove the probe from the resin tank. Make sure pressure is relieved on tank before removing probe.
2. Visual inspection
  - a. Look for discoloration (brown film or blue spots) on electrode fins.
  - b. If discolored, try cleaning the probe (Sofner-Gard chemical or white vinegar). The fins can be lightly scrubbed with a soft toothbrush.

## Testing

1. Set the chamber in a stand so that it is vertical.
2. Remove the top plug and lower the probe to be tested into the chamber until it bottoms, then lift it up an inch or so; the electrodes must not touch the sides of the chamber
3. Unplug the control and place the softener control into the test mode (Set DIPswitch 1 to the ON) position
4. Connect the sensor to the control circuit board
5. Plug the control in again (in test mode)
6. With the probe fully immersed in the resin, it should be in a balanced condition; depending on the control being used, you should observe one of the following responses:
  - Press the STATISTICS key until display shows the REGEN enunciator (upper left corner of the display); it should appear steady; if flashing, the probe is faulty.
  - Alternate Method: With the circuit board in the RUN mode (DIPswitch 1 in the OFF position), press the STATISTICS key, then the + key; a steady A should appear; if flashing, the probe is faulty.
7. Now lift the probe so that the upper cell pair is out of the resin and water mixture; it should now be unbalanced and you should observe one of the following responses:
  - Press the STATUS key until display shows the REGEN enunciator (upper left corner of the display); it should appear to be flashing; if steady, the probe is faulty.
  - Alternate method: With the circuit board in the RUN mode (DIPswitch 1 in the OFF position), press the STATISTICS key, then the + key; a flashing A should appear; if steady, the probe is faulty.
8. At the completion of the test, disconnect the power from the control, reinstall the sensor into the resin tank, return the control to the RUN position (DIPswitch 1 in the OFF position) and set any other DIPswitches to activate the desired feature(s)
9. Restore the control's power (it will home) and reprogram to the desired settings. Put the unit into regeneration to settle the probe into the resin.

## Resin and Regeneration

If the circuit board and the probe pass all tests, the condition of the resin or the regeneration process may actually be to blame.

- 1) While the probe is out of the tank, take a sample of resin and examine it for breakage (fines) and fouling.
- 2) Remove the power to the control.
- 3) Return the probe to the tank and reconnect it to the circuit board.
- 4) Power up the control and verify that the program matches the settings recorded at the beginning of the procedure. Also, make sure that the settings are correct for the application. It is recommended that the brine rinse time be left at the default setting of 99 minutes (increase for higher salt dosages or low inlet pressure conditions) to assure adequate rinse time. The Automatic Rinse Time feature will shorten the actual rinse time as it detects the passage of the salt from the tank. Setting the time at too short a value could prevent complete rinse-out and cause daily regeneration.
- 5) Backwash the unit for 2 – 3 minutes after installing the probe to eliminate any air pockets in the unit.
- 6) Check the unit for regeneration function (salt dosage, brine draw, rinse and refill).

## AQUA-SENSOR Troubleshooting Flowchart

Problem:

Regenerates  
Nightly

Diagnostics Sequence:

Check water  
usage; is it higher  
than expected?

Check Brine Draw/Slow  
Rinse time in minutes  
(Menu 6). The  
default setting is  
99 minutes. If it  
has been reduced,  
restore it to at  
least the default

Check salt  
dosage; high salt  
dosages can  
extend rinse out

Check eductor  
nozzle and screen  
for plugging or  
fouling

Check brine refill  
function. Short  
salting could cause  
reduced capacity

Test circuit board  
& probe

Check seal pack  
for internal leak

Check Resin

Never  
Regenerates

2.5 VAC power  
supplied?

Is there salt in the  
brine tank?

Does the unit  
draw brine  
properly?

Initiate a manual  
regeneration; is  
the water soft?

Test circuit board  
& probe

Check Resin

## Circuit Board Troubleshooting

Most circuit board problems are caused by outside influences and it is not the board itself. Replacing the board may seem to work only because the cause hasn't reappeared – yet.

Let's start with what to check when you come upon a circuit board problem:

1. **Are those switches aligned too closely to the cam?**  
There should be a small but obvious gap between the switches and the cam so that a "wobbling cam" doesn't accidentally bump the switch.
2. **Has the seal pack been checked for free movement?**  
Feedback and experience has demonstrated that seal packs that are over-tightened create drag on the motor and delays that would result in an error code: If the motor never stops (still runs after the desired position is sensed, causing unexpected switch closures) OR if the motor gets stuck "timing out" and the control never sees any switch action.
3. **Are all the wiring terminals tightly connected?**  
Sometimes a loose or poorly connected wire can give feedback to the board that would result in an error code or default.
4. **After checking all of these possibilities you should run the diagnostics (test mode) on the board**  
Instructions are listed on page 44.

Listed below are some other circuit board problems and their explanations:

### **Board skips the service position or only stops for a second in service before advancing to the backwash position**

Board has been armed for regeneration. Let the board time out of the last cycle OR reset and reprogram the board.

### **Motor goes round and round**

Only one of two things can happen when this is the case; it can find its desired position or it gives you an error code. So, LET IT RUN until you find out which will occur.

- If the motor still runs or there is power to motor after the error code is displayed, then the triac is likely bad – change the board.
- If the error code is displayed and the motor is stopped (no power to the motor), check switches, cam and wire harness – the board got a signal it wasn't supposed to or a connection failed.

### **A word about triacs –**

A triac is an electronic switch and can "latch on" when it becomes overheated from a laboring motor (tight seal pack). It may operate properly when it cools down. A continuously running motor could be caused by an overheated triac. Checking the seal pack and voltage draw and allowing the triac to cool down could give you favorable result and prevent the need to change the board. Otherwise, when it is sent to Returned Goods it could test good and be returned.

### **You clear an error code and it starts into regeneration**

It was either in regeneration or has kept track of time since the error code occurred and it's trying to finish the regeneration. Reset and reprogram the board.

### **The board repeatedly defaults, resets or gains time**

Look at the power supply or source. Most of these issues are caused by the power source, so-called "dirty power" having noise interference or incorrect voltage. This could be erratic fluctuations caused by other heavy power draws, poor wiring, low voltage wiring running along high voltage, having active electrical storms that causes "corruption" of the EEPROM. Consider the use of a surge protector or an uninterruptible power supply after you see this repeatedly.

If you suspect the power source is causing problems, take a voltage reading at the outlet, at the power connection on the board, and on the motor leads while the motor is running. We are looking for a consistent range of 108-132 volts at the receptacle and 22-28 volts on the board. Also, the wall transformer is only used to step down the voltage; it is not used for protection or filtering the power source.

# Service

Familiarize yourself with the replacement procedures and component parts thoroughly before attempting any repair.



**WARNING!** Disconnect all electrical power to the unit before servicing. Bypass the unit and relieve system pressure before attempting repair.

## Circuit Board

To replace the AccuSoft™ Plus circuit board, refer to the parts list and proceed as follows:

1. Remove the timer cover by unsnapping it from the back plate.
2. Unhook the circuit board mounting plate by lifting the top snap and removing from the backplate.
3. Remove all connected wire leads from the board.



**CAUTION!** Grip all connections to the circuit board by the connecting terminals for assembly and disassembly. Failure to do so could result in damage to the wire leads or connecting terminals.

4. Unsnap the circuit board from the mounting plate. See Figure 22.



**CAUTION!** Do not touch any surfaces of the circuit board. Electrical static discharges may cause damage to the board. Handle the AccuSoft™ circuit board by holding only the edges of the circuit board. Keep replacement boards in their special anti-static bags until ready for use. Mishandling of the circuit board will void the warranty.

5. The new circuit board can be installed by reversing the steps 1-4 above. When reassembling the mounting plate to the backplate, it is easiest to hook the top snap first and then gently push the base in until it snaps into place.



**CAUTION!** The wire connectors must be connected to the circuit board properly. The wires must exit the plug-in connector opposite of the raised white base of the circuit board connector.

**CAUTION!** Extra care should be taken when connecting the 2.5 vac and 24 vac power. Failure to connect properly will result in damage to the circuit board.

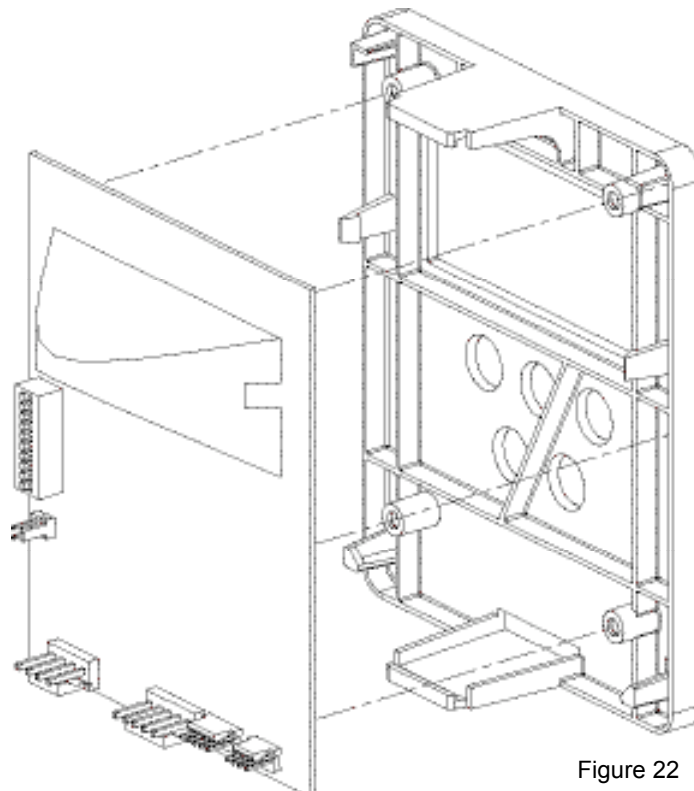


Figure 22



Refer to Figure 23 for assembly and disassembly of the various valve components listed below.

### Drive Motor Assembly

1. Remove the drive motor cam switches by removing the one screw holding the switches to the motor
2. Remove the E-ring holding the drive motor cam to the camshaft with a flat tip screwdriver.
3. Lift the cam off the shaft.
4. Remove the screw above the eductor piston assembly.
5. Loosen the two screws holding the yoke support plate and the motor to the control valve.
6. Remove the yoke support plate and yoke by gently pulling them down.
7. Fully remove the two screws holding the motor to the control. The motor will pull away from the control.

**NOTE:** Care should be taken to not damage the brine piston if it is not going to be replaced. The brine piston will need to be twisted slightly in order to remove it from the motor die casting.

This procedure can be followed in the reverse order to reassemble the motor to the control. When reassembling the scotch yoke, the yoke must slide into the yoke support plate prior to pushing the assembly up into the piston end and follower. Figure 24 shows proper assembly of the yoke into the support plate.

**NOTE:** The seal pack may need to be repositioned in order for the follower to be inserted into the yoke, using the motor and backplate to push the seal pack fully into the valve is helpful in aligning the yoke. Make sure that the follower is in the follower slot on the yoke, and that the end of the piston rod is held in the end of the yoke.

**NOTE:** When attaching the support plate be certain to push up on the plate until the two mounting screws bottom in the U-shaped channels of the support plate.

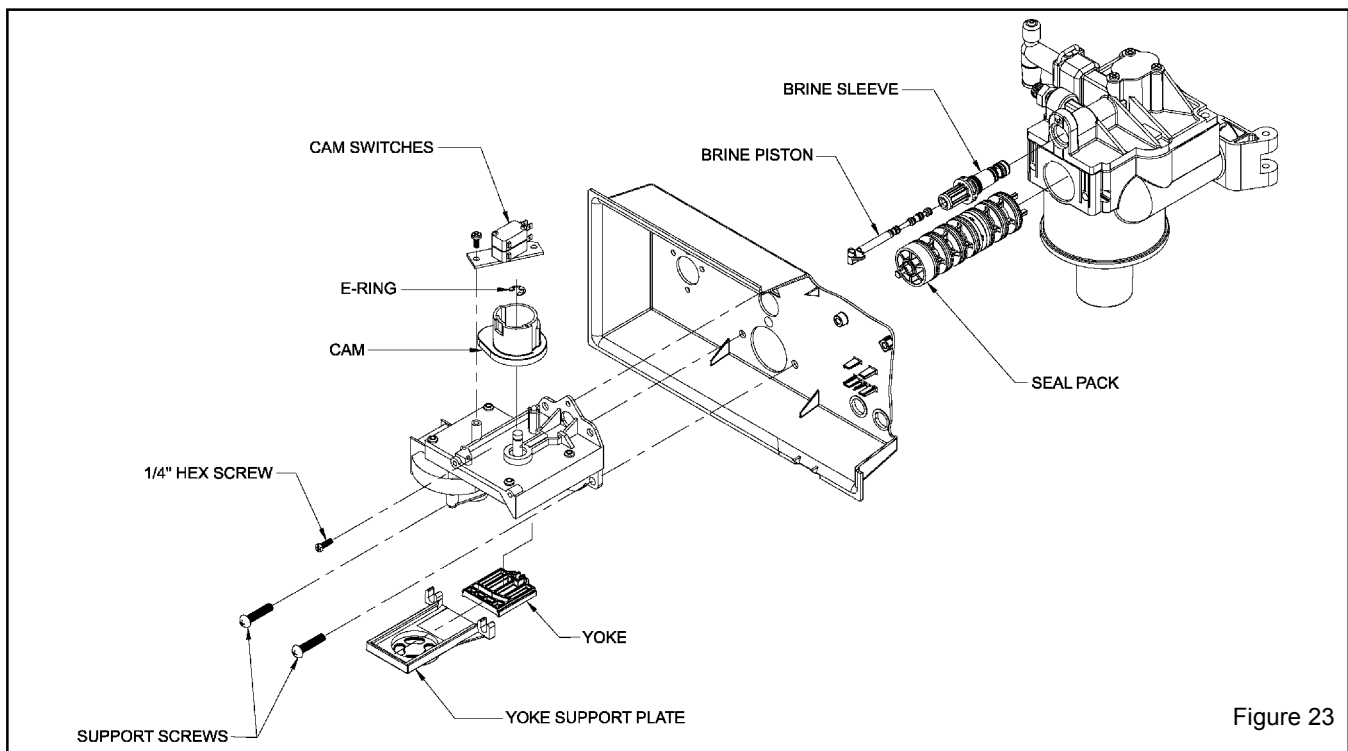


Figure 23

## Seal Pack Assembly

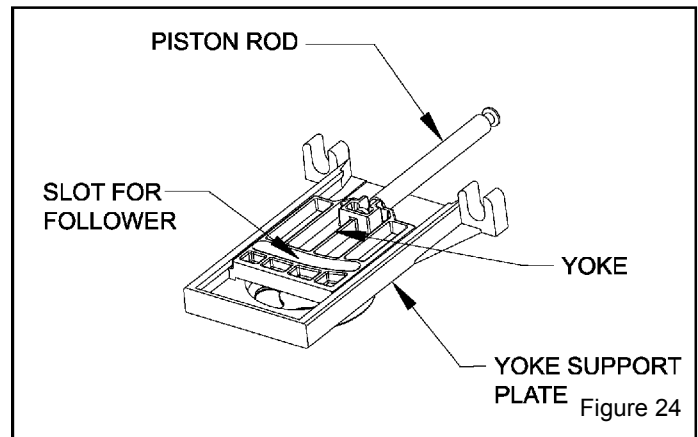
Follow the instructions for the replacing drive motor assembly through step 7, then continue as follows:

1. With the drive motor set aside, firmly pull the seal pack assembly from the valve body.
2. Lightly lubricate the o-rings of the replacement seal pack with silicone grease.
3. Reverse the procedure for reassembly.

**NOTE:** Use only silicone grease; petroleum-based lubricants will cause the degradation of the rubber components.



**CAUTION!** Do not twist the seal pack upon insertion. This can cause the outer o-rings to pinch, cut, or crimp.



## Eductor Piston/Eductor Sleeve Assembly

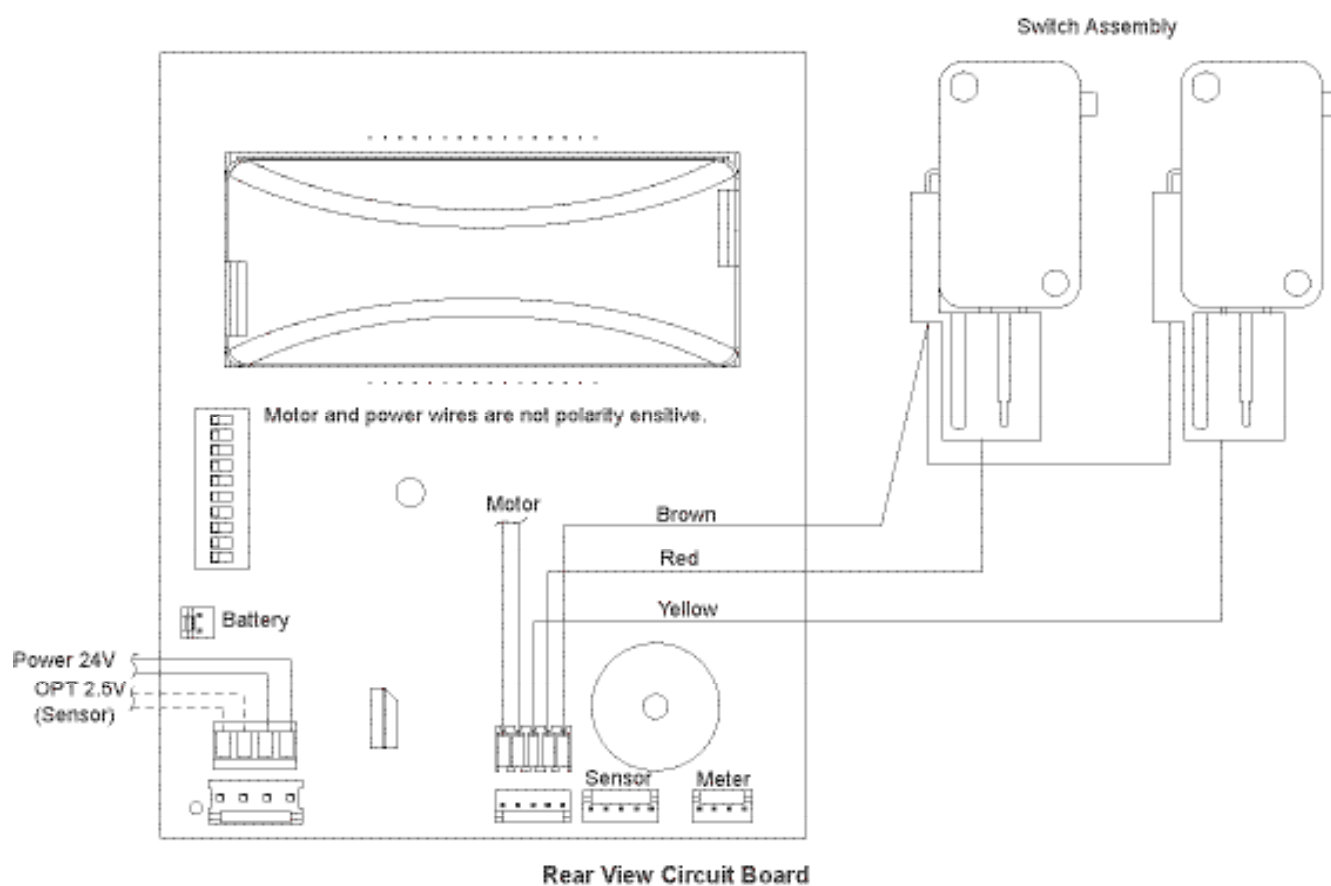
Follow the instructions for the replacing drive motor assembly through step 7, then continue as follows:

1. With the drive motor set aside, firmly pull the eductor piston & sleeve assembly from the valve body.
2. Lightly lubricate the o-rings of the replacement piston & sleeve assembly with silicone grease.
3. Reverse the procedure for reassembly.

**NOTE:** Use only silicone grease; petroleum-based lubricants will cause the degradation of the rubber components.

**NOTE:** The eductor piston & sleeve assemblies are unique to the softener, filter, and controls. Refer to the parts list to ensure that the proper assembly is used.

# Wiring Schematic



# Appendix A

**Table 1** - Dimension "X" is the exposed length the Aqua-Sensor® cord (cord length from the Aqua-Sensor® plug to the circuit board connector). You can then verify the Aqua-Sensor® probe is inserted to the proper depth by confirming dimension "X" is at the corrected length.

Model	X	Y
9" Quadra-Hull™ Tank	34 1/2"	40"
10" Quadra-Hull™ Tank	30 1/2"	44"
12" Quadra-Hull™ Tank	32 1/2"	42"
14" Quadra-Hull™ Tank	22 1/2"	52"

**Table 2 - Maximum Allowable Drain Line Length**

Operating Pressure	0 ft (0m)	2 ft (0.6m)	4 ft (1.2m)	6ft (1.8m)	8ft (2.4m)	10ft (3m)
30psi (210 kPa)	60 ft (18 m)	50 ft (15 m)	30 ft (9 m)	15 ft (5 m)	Not allowable	Not allowable
40 psi (279 kPa)	100 ft (30 m)	90 ft (27 m)	70 ft (21 m)	50 ft (15 m )	30 ft (9 m)	12 ft (4 m)
50 psi (349 kPa)	145 ft (41 m)	115 ft (35 m)	80 ft (24 m)	80 ft (24 m)	60 ft (18 m)	40 ft (12 m)
60 psi (419 kPa)	Normal Installation should not require more than 100 ft (30 m) of drain line			100 ft (30 m)	85 ft (26 m)	60 ft (18 m)
80 psi (559 kPa)				140 ft (43 m)	120 ft (37 m)	
100 psi (669 kPa)				150 ft (46 m)		

**Table 3 - Media Volumes and Freeboard**

Model	Cullex® (ft³) (A)	Cullsan (lbs) (B)	Freeboard (in)* (C)
9"	1.0	12	14.5
10"	1.5	15	14.5
12"	2.0	16	16
14"	3.0	25	20

\* Measured from the top of the resin to the top surface of tank threads.

**Table 4 - Flow Rates**

Model	Service	Backwash/Fast Rinse	Brine Draw	Slow Rinse	Refill
9"	9.0 gpm @ 13 psi	1.6 - 2.2 gpm	0.44 gpm	0.27 gpm	0.45 gpm
10"	9.6 gpm @ 15 psi	1.6 - 2.2 gpm	0.44 gpm	0.27 gpm	0.45 gpm
12"	10.0 gpm @ 15 psi	2.6 - 4.0 gpm	0.93 gpm	0.27 gpm	0.80 gpm
14"	10.6 gpm @ 16 psi	5.5 - 6.7 gpm	1.85 gpm	1.35 gpm	0.80 gpm

**Table 5 - Capacities**

Gold 9"x48"			NaCl				KCl				A" Dim	
			Total Capacity		Capacity to Signal		Total Capacity		Capacity to Signal			
Hardness	Salt Dosage	Brine Rinse Time	STD	EFF	STD	EFF	STD	EFF	STD	EFF	250 lb	375 lb
5	5	56	4079	4079	2855	3753	3263	3263	2284	3002	8	6 1/2
12	6	59	1903	1903	1332	1751	1522	1522	1065	1400	9 3/8	7 1/2
17	7	62	1470	1470	1029	1352	1176	1176	823	1082	10 7/8	8 1/2
22	8	65	1221	X	855	X	976	X	683	X	12 1/4	9 1/2
32	9	68	888	X	622	X	711	X	498	X	13 5/8	10 1/2
42	10	71	708	X	496	X	566	X	396	X	15	11 1/2
50	10	71	594	X	416	X	475	X	333	X	15	11 1/2
58	11	73	530	X	371	X	424	X	297	X	16 3/8	12 1/2
66	12	76	476	X	333	X	381	X	267	X	17 3/4	13 1/2
74	13	79	430	X	301	X	344	X	241	X	19 1/8	14 1/2
82	14	81	390	X	273	X	312	X	218	X	20 1/2	15 1/2

Gold 10"x54"			NaCl				KCl				A" Dim.
			Total Capacity		Capacity to Signal		Total Capacity		Capacity to Signal		
Hardness	Salt Dosage	Brine Rinse Time	STD	EFF	STD	EFF	STD	EFF	STD	EFF	375 lb
5	7	56	5632	5632	3942	5181	4506	4506	3154	4146	8 1/2
12	9	59	2618	2618	1833	2409	2095	2095	1467	1927	10 1/2
17	10	62	1938	1938	1357	1783	1550	1550	1085	1426	11 1/2
22	12	65	1627	X	1139	X	1301	X	911	X	13 1/2
32	13	68	1160	X	812	X	928	X	650	X	14 1/2
42	15	71	941	X	659	X	753	X	527	X	16 1/2
50	15	71	791	X	554	X	633	X	443	X	16 1/2
58	16	73	701	X	491	X	561	X	393	X	17 1/2
66	18	76	647	X	453	X	517	X	362	X	19 1/2
74	19	79	589	X	412	X	471	X	330	X	20 1/2
82	20	81	542	X	379	X	433	X	303	X	21 1/2

Gold 12"x52"			NaCl				KCl				A" Dim.
			Total Capacity		Capacity to Signal		Total Capacity		Capacity to Signal		
Hardness	Salt Dosage	Brine Rinse Time	STD	EFF	STD	EFF	STD	EFF	STD	EFF	375 lb
5	10	51	7355	7355	5149	6767	5884	5884	4119	5413	11 1/2
12	12	54	3405	3405	2384	3133	2724	2724	1907	2506	13 1/2
17	14	57	2623	2623	1836	2413	2099	2099	1469	1931	15 1/2
22	16	60	2182	X	1527	X	1745	X	1222	X	17 1/2
32	18	63	1596	X	1117	X	1276	X	893	X	19 1/2
42	20	66	1281	X	897	X	1024	X	717	X	21 1/2
50	20	66	1076	X	753	X	861	X	603	X	21 1/2
58	22	69	968	X	678	X	775	X	543	X	23 1/2
66	24	72	882	X	617	X	706	X	494	X	25 1/2
74	26	76	810	X	567	X	648	X	454	X	27 1/2
82	28	79	747	X	523	X	598	X	419	X	29 1/2

Gold 14"x65"			NaCl				KCl				A" Dim.
			Total Capacity		Capacity to Signal		Total Capacity		Capacity to Signal		
Hardness	Salt Dosage	Brine Rinse Time	STD	EFF	STD	EFF	STD	EFF	STD	EFF	650 lb
5	15	46	11,696	11,696	8187	10,760	9357	9357	6550	8608	8 1/2
12	18	48	5370	5370	3759	4940	4296	4296	3007	3952	10 1/2
17	21	50	4107	4107	2875	3778	3286	3286	2300	3023	12
22	24	52	3391	X	2374	X	2713	X	1899	X	13 3/4
32	27	55	2463	X	1724	X	1970	X	1379	X	15 1/2
42	30	58	1962	X	1373	X	1570	X	1099	X	17 1/4
50	30	58	1648	X	1154	X	1319	X	923	X	17 1/4
58	33	61	1473	X	1031	X	1178	X	825	X	18 7/8
66	36	64	1331	X	932	X	1065	X	746	X	20 1/2
74	39	67	1212	X	848	X	970	X	679	X	22 1/2
82	42	70	1109	X	776	X	888	X	622	X	24

# Appendix B

## Aqua-Sensor® Application Guidelines

Parameter	Value
Hardness (gpg as CaCO <sub>3</sub> )	7 - 99 (See Notes 1 & 2)
Soluble iron (ppm as Fe)	< 2 (See Note 3)
Manganese (ppm as Mn)	< 0.5 (See Note 4)
Hardness versus Salt Dosage	See Table 1 and Note 2
TDS to Hardness Index	TDS hardness (as CaCO <sub>3</sub> ) <10 (i.e., hardness must be at least 10% of TDS; see Note 5)
Temperature, °F	Any within equipment's operating range
Alum and phosphate	Anecdotal evidence indicates potential foulant; effect has not been confirmed experimentally
Commercial cell: distance between sensing and reference cell pairs	6 inches (See Note 2)
Residential cell: distance between sensing and reference cell pairs	3 inches (See Note 2)

**Table x - Hardness vs. Salt Dosage**

Hardness (gpg as CaCO <sub>3</sub> )	Recommended Salt Dosage (lbs/ft <sup>3</sup> )
7-10	5-6
10-15	6-8
15-25	8-9
25-50	9-11
50-75	11-12
75-99	12-16

Avoid using maximum salt dosages. The sensor doesn't require high salt dosages to operate effectively. Attached is a table with suggested salt dosages at various hardness ranges. Maximum dosages defeat the purpose salt efficiency feature of the Aqua-Sensor® sensing device and prolong rinse times and, daily regeneration may occur. It is also important the correct eductor nozzle is used to ensure proper salt dosages.

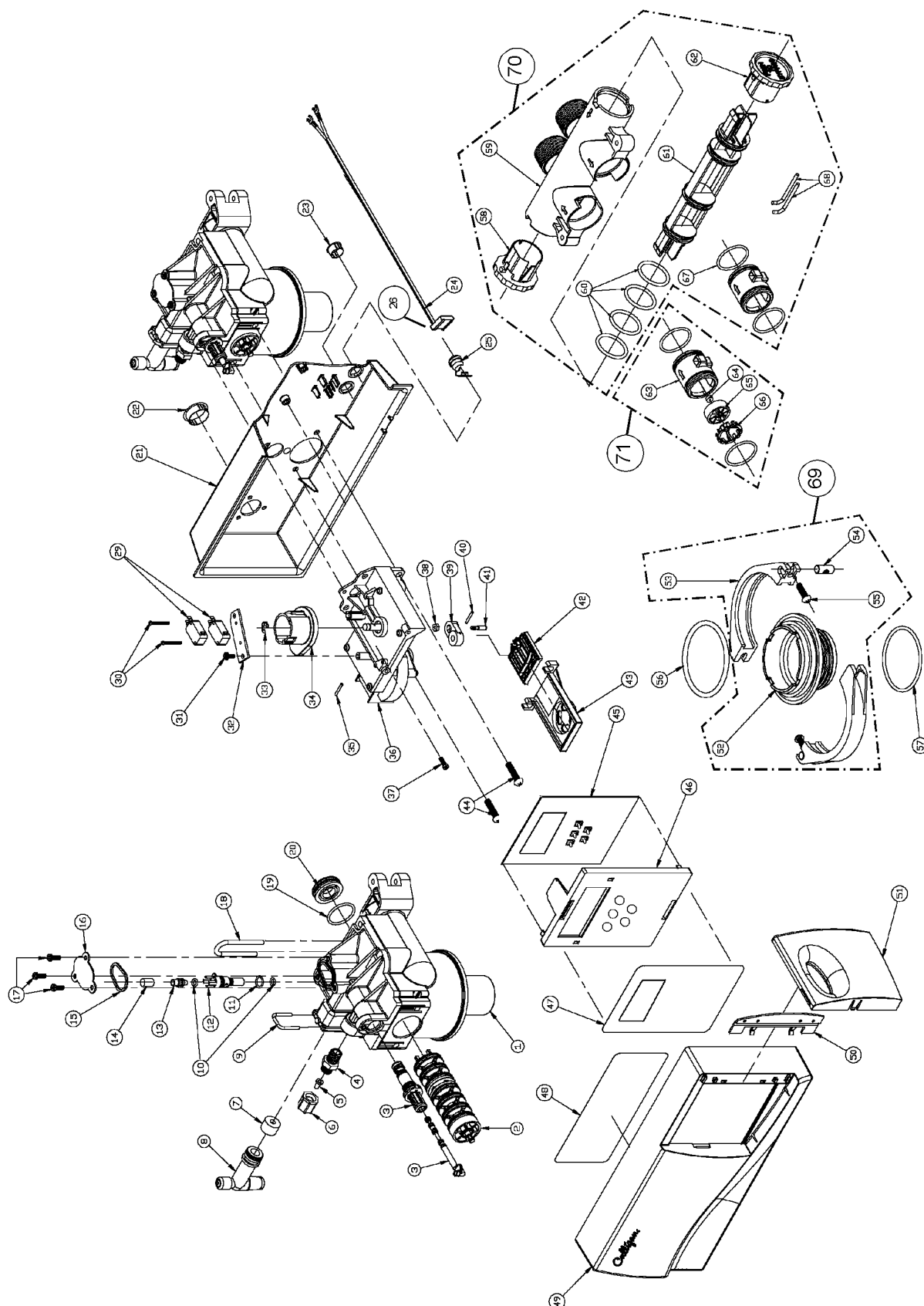
### Notes:

- 1) Although the Aqua-Sensor® device has been used successfully on water with hardness as low as 3 gpg, there is an increased risk of missed signal (no regeneration) when the hardness less than 6 gpg.
- 2) For each tank diameter, there is a specific volume of resin in the space between the cell pairs. The capacity of that resin is influenced by hardness and salt dosage. Any combination of flow rate and hardness that causes the hardness front to pass through that volume of resin in less than 6 minutes will result in the sensor failing to detect the need to regenerate.
- 3) If precipitated or bound iron is present it must be removed before the softener.
- 4) Manganese can deposit on the sensor electrodes, particularly on the upper pair, causing missed signals (no regeneration). Periodic cleaning may be needed to maintain satisfactory performance.
- 5) Adequate signal strength has been demonstrated at ratios as high 14 but signal strength diminishes with decreasing TDS to hardness index.

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# Parts List

## Control





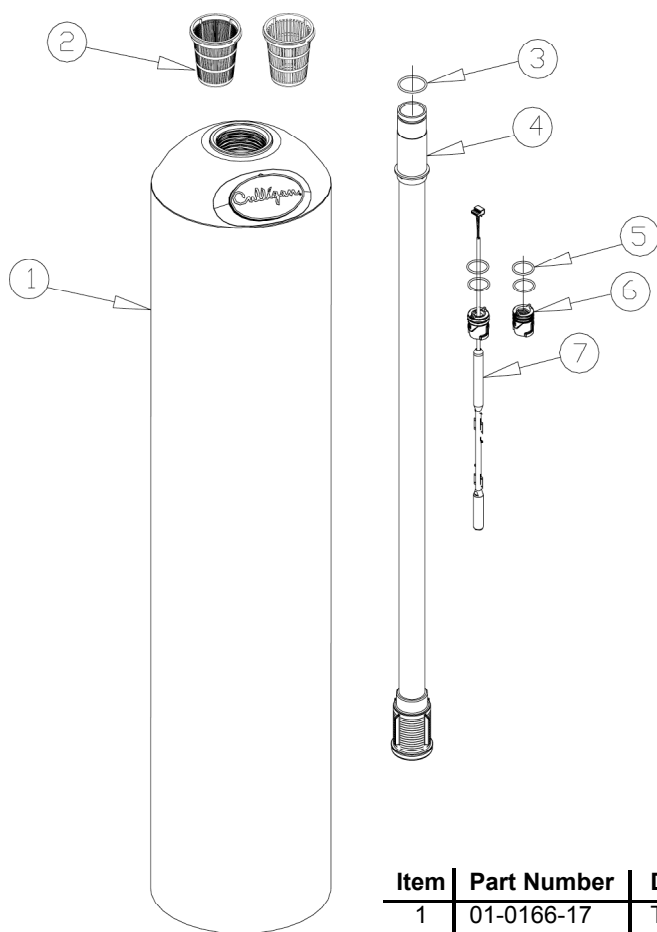
Item	Part No.	Description	Item	Part No.	Description
—	01-0171-31	Control Valve Assembly - Gold Series	35	00-4452-46	Roll Pin
1	01-0139-76	Control Valve	36	01-0141-79	Drive Motor & Bracket Assembly 24V/60Hz
‡ 2	01-0130-83	Seal Pack Assembly	37	01-0017-84	Screw
‡ 3	01-0136-06	Eductor Sleeve and Eductor Piston Assembly	38	00-3183-54	Nut
‡ *	P0-4479-86	O-Ring, Eductor Sleeve, Small O-Ring (25/Kit)	39	00-4452-21	Bellcrank
‡ *	P0-3084-07	O-Ring, Eductor Sleeve, Large O-Ring (25/Kit)	40	00-4435-59	Roll Pin
‡ *	P0-4487-50	Screen, Eductor Sleeve (10/Kit)	41	01-0126-49	Follower
‡ *	00-4479-87	O-Ring, Eductor Piston (10/Kit)	42	01-0126-48	Yoke
4	00-4432-91	Connector Brine Line	43	01-0126-47	Bracket
5	P0-3031-92	Insert, PP, 0.312" (25/Kit)	44	00-3184-52	Screw
6	P0-3031-93	Nut, PP, 0.312" (25/Kit)	45	01-0170-32	Circuit Board
7	P0-3316-35	Backwash Restrictor, #2 (brown), 9" & 10" Tanks (10/Kit)	46	01-0164-76	Circuit Board Mounting Plate
			47	01-0164-78	Timer Label
8	P0-3316-36	Backwash Restrictor, #3 (green), 12" Tanks	49	01-0140-26	Cover
	00-4010-31	Backwash Restrictor (black), 14" Tanks	50	01-0140-30	Hinge
	00-4468-35	Drain Elbow Assembly w/O-Ring	51	01-0164-75	Door
9	00-4473-87	Retainer, Drain Elbow	52	01-0139-58	Tank Adapter
‡ 10	P0-3084-38	O-Ring, Eductor Nozzle and Throat (10/Kit)	53	01-0139-59	Tank Clamp
‡ 11	00-3084-37	O-Ring, Eductor Throat	54	01-0136-69	Clamp Pin
‡ 12	00-4012-48	Eductor Throat w/O-Rings (light brown), 9", 10" & 12" Tanks	55	00-318-383	Screw
			56	01-0148-48	O-Ring
‡ 13	01-0141-42	Eductor Throat w/O-Ring , 14" Tank	57	00-4400-52	O-Ring
* *	00-4460-38	Eductor Nozzle - Blue, 9" & 10" Tanks	58	01-0139-63	Knob, Bypass - Service
	00-4460-39	Eductor Nozzle Beige, 10" & 12" Tanks	59	01-0164-65	Bypass Body, 1-1/4" NPT
14	00-4477-52	Eductor Nozzle (green), 14" Tank	60	01-0164-67	O-Ring
‡ 15	P0-4452-69	Eductor Screen (10/Kit)	61	01-0164-66	Bypass Stem
	00-4457-97	Gasket	62	01-0139-64	Knob, Bypass - Bypass
16	00-4010-22	Eductor Port Cover	63	01-0080-66	Coupling
17	00-4486-87	Screw	64	01-0080-69	Meter Bearing
18	00-4481-28	Retainer, Rear Body Plug	65	01-0080-67	Impeller
‡ 19	P0-4449-14	O-Ring, Rear Seal (10/Kit)	66	01-0080-65	Snap-In Retainer
20	00-4481-26	Rear Body Plug	67	01-0090-99	O-Ring
21	01-0140-27	Control Back Plate	68	01-0090-75	Assembly Pins
22	01-0139-66	Plug, 1.000" Snap-in	69	01-0141-53	Adapter Assembly (Includes Items 52 - 55)
23	01-0064-98	Plug, .562" Snap-in	* *	01-0129-56	Wall Mount Transformer
24	01-0171-34	Power Cord	* *	01-0171-35	Wire, Motor Wire Harness
25	01-0003-72	Strain Relief	70	01-0164-64	1-1/4" Bypass Assembly
26	01-0172-64	Wire Connector	71	01-0111-88	Flow Meter Assembly w/ Harness
‡ 29	01-0032-44	Switch	* *	01-0129-58	Wire Harness, Cam
30	00-4486-86	Screw	* *	P0-4517-01	Hose Clamp, Drain
31	00-3184-55	Screw	* *	01-0128-44	Flow Meter Harness
32	00-4010-40	Switch Bracket	* *	01-0138-39	Back-up Battery
33	P1-0130-43	Retaining E-Ring (10/Kit)	* *	01-0148-97	Wall Mount, Transformer - Aqua-Sensor®
34	01-0130-31	Cam	* *	01-0172-64	Power Cord Connector

\* Not Illustrated

‡ Recommended Spare Parts

## Service Parts Kits

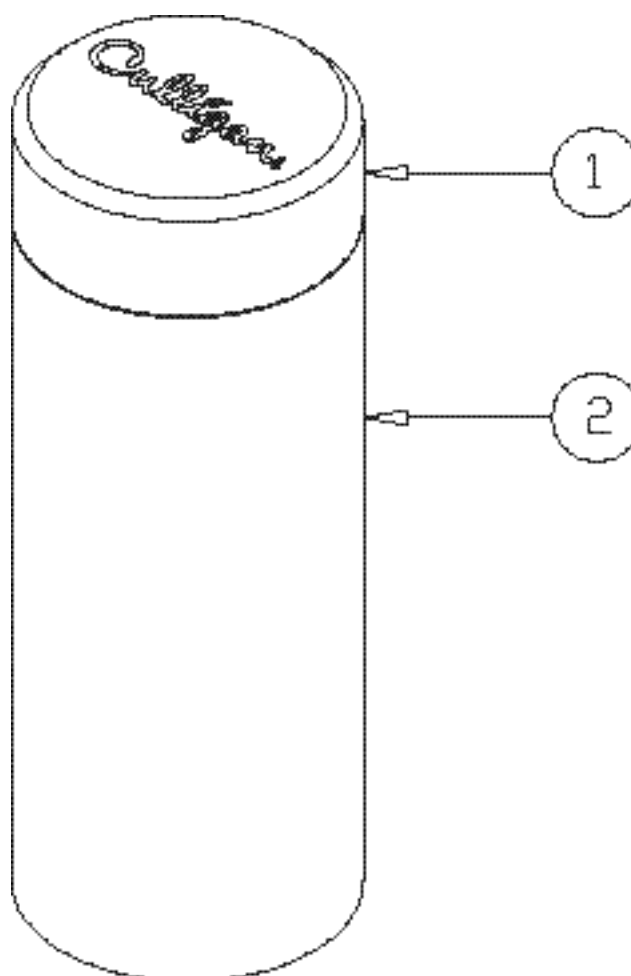
Item	Part No.	Description
	01-0162-67	Power Valve Seal Rebuild Kit
2		Seal Pack
3		Eductor Sleeve w/ O-Rings
3		Brine Piston w/ O-Rings
	01-0162-66	PV Eductor Rebuild Kit
12		Light Brown Eductor w/ O-Ring
13		Blue Restrictor w/ O-Ring
13		Beige Restrictor w/ O-Ring
14		Eductor Screen
15		Eductor Port Gasket
7		Black Flow Control (1.2 gpm)
7		Brown Flow Control (2.0 gpm)
7		Green Flow Control (3.5 gpm)
8		Drain Elbow Assembly w/ O-Ring
	01-0162-69	Power Valve Drive & Seal Rebuild Kit
2		Seal Pack
3		Eductor Sleeve w/ O-Rings
3		Brine Piston w/ O-Rings
43		Scotch Yoke Bracket
42		Scotch Yoke
38,39,40,41		Bell Crank & Follower Assembly
44		Screw (2 each)
33		E-Ring
34		Cam
	01-0141-79	Drive Motor Kit
36		Motor
39		Bell Crank
38		Nut
41		Follower
40		Roll Pin
35		Roll Pin
32		Switch Bracket
31		Screw (2 each)



## Tank Assembly

Item	Part Number	Description	Qty.
1	01-0166-17	Tank Assembly, 9" w/ Fillport, Complete	
	01-0166-18	Tank Assembly, 10" w/ Fillport, Complete	
	01-0171-92	Tank Assembly, 12" w/ Fillport, Complete, Less Media	
	01-0171-94	Tank Assembly, 14" w/ Fillport, Complete, Less Media	
	01-0163-51	Tank Assembly, 9" w/o Fillport, Complete	
	01-0163-52	Tank Assembly, 10" w/o Fillport, Complete	
	01-0171-91	Tank Assembly, 12" w/o Fillport, Complete, Less Media	
	01-0171-93	Tank Assembly, 14" w/o Fillport, Complete, Less Media	
	01-0163-49	Tank Replacement, 9", w/ Fillport, Empty	
	01-0163-50	Tank Replacement, 10", w/ Fillport, Empty	
	01-0165-20	Tank Replacement, 12", w/ Fillport, Empty	
	01-0165-22	Tank Replacement, 14", w/ Fillport, Empty	
	01-0163-47	Tank Replacement, 9", w/o Fillport, Empty	
	01-0163-48	Tank Replacement, 10", w/o Fillport, Empty	
	01-0165-19	Tank Replacement, 12", w/o Fillport, Empty	
	01-0165-21	Tank Replacement, 14", w/o Fillport, Empty	
2	01-0098-47	Top Strainer - Fine Slot	
	01-0111-95	Top Strainer - Wide Slot	1
3	01-0090-99	O-Ring, Manifold	1
4	01-0161-76	Outlet Manifold - 9"	1
4	01-0145-39	Outlet Manifold - 10"	1
4	01-0145-40	Outlet Manifold - 12"	1
4	01-0164-29	Outlet Manifold - 14"	1
5	EV3038-11	O-Ring, Plug and Sensor	2
6	01-0151-22	Plug	1
7	01-0165-68	Aqua-Sensor® Probe	1

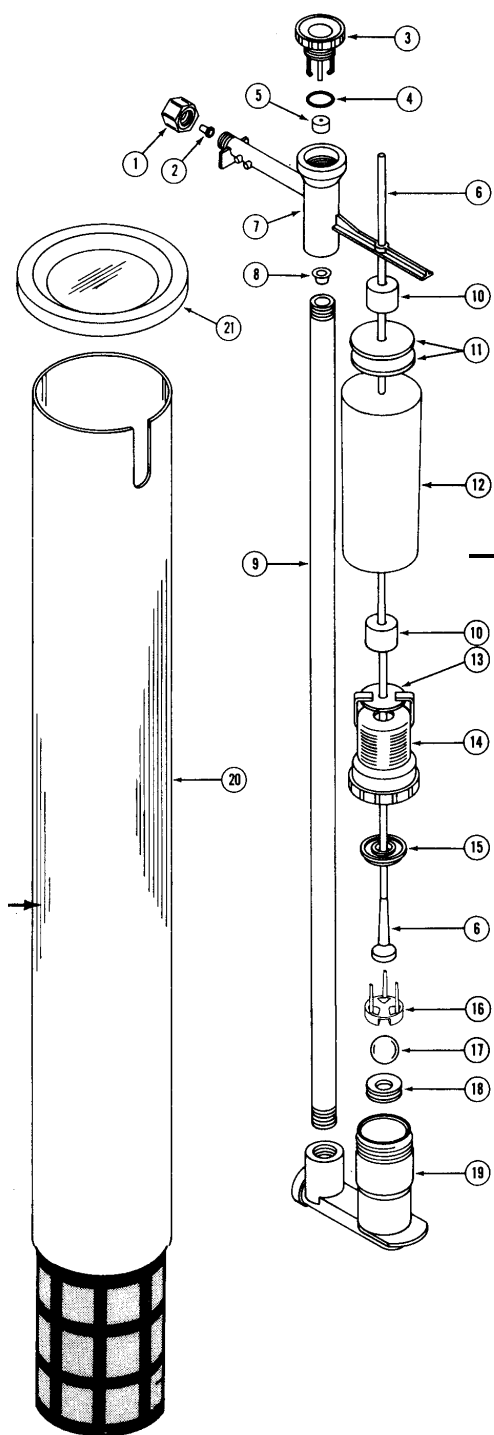
## Brine Tank



Item	Part Number	Description
—	00-4413-90	Brine System, 160 lb. Replacement
—	00-4418-86	Brine System, 250 lb. Replacement
—	00-4418-87	Brine System, 375 lb. Replacement
1	00-3039-93	Cover, 250 lb. (114 kg)
	00-4010-42	Cover with Gold Band (No Culligan Logo), 160 lb. (73 kg)
	00-3039-80	Cover, 375 lb. (170 kg)
2	00-3040-10	Tank Only, 250 lb. (114 kg)
	00-4413-91	Tank Only, 160 lb. (73 kg)
	00-3039-75	Tank Only, 375 lb. (170 kg)
*	00-3044-30	Salt Plate, Plastic, 250 lb. (114 kg)
*	00-3044-39	Salt Plate, Plastic, 375 lb. (170 kg)

\* Not Illustrated

# Brine Valve - 9" and 10" Tanks

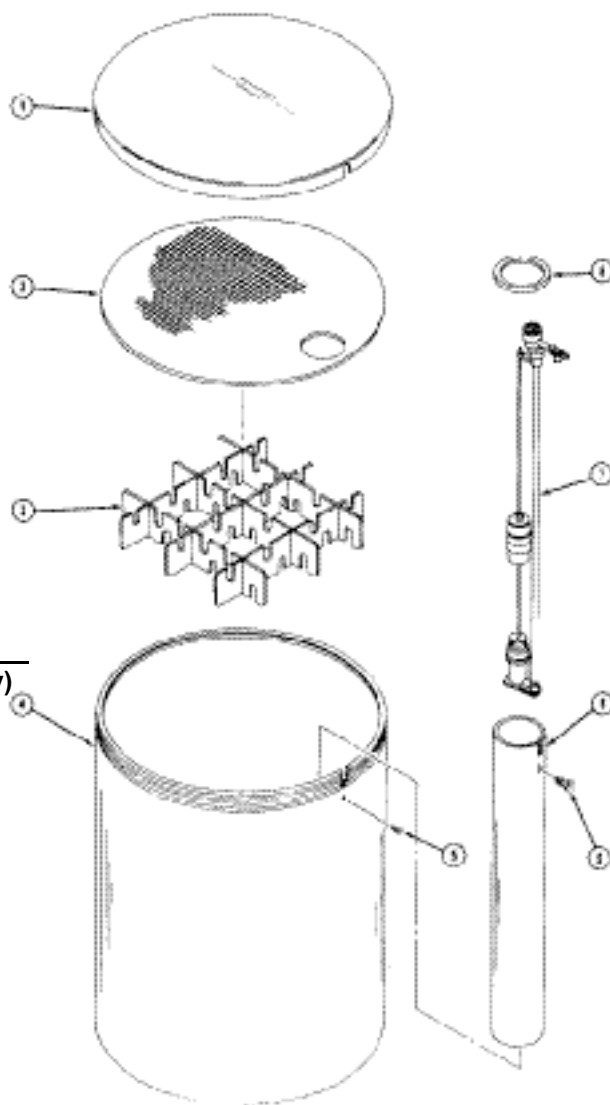


Item	Part Number	Description
—	00-4418-88	Brine Valve Assembly
—	00-4011-41	Brine Valve Assy., Brine Tank, 160 lb.
1	00-3031-93	Plastic Nut, 5/16-inch
2	00-3031-92	Plastic Insert
3	00-4407-96	Refill Cap
±4	00-3084-07	O-ring
±5	00-4016-22	Flow Restrictor, No. 5, 0.45 gpm (170 lpm)
6	00-3400-14	Stem Seat Assy., 250 lb. (114 kg) & 375 lb. (170 kg)
7	00-4407-95	Refill Body
±8	00-3325-28	Hat Screen
9	00-2234-35	Plastic Pipe, 1/4-inch NPT x 35 inches long, 250 lb. (114 kg) & 375 lb. (170 kg)
10	00-3047-03	Float Retainer (2 required)
11	00-3047-18	Float Weight, Stainless Steel (2)
12	00-4448-73	Float
13	00-3320-72	Screen Top Seal
14	00-4446-64	Filter Screen Cap
±15	00-4444-96	Stem Seat
16	00-4473-92	Insert
17	00-4477-81	Air Eliminator Ball
±18	00-3048-04	Ball Seat
19	00-5418-21	Float Valve Body with Ball Seat
	00-5418-34	Float Valve Body with Ball Seat, 150 lb. Brine Tank
20	00-3045-37	Brine Valve Chamber, 250 lb. (114 kg) & 375 lb. (170 kg) Salt Storage Tank
	00-4413-92	Brine Valve Chamber, 160 lb. (Shown)
21	00-3046-06	Cap, Brine Valve Chamber
*	00-4463-88	Screw, St. Steel, Brine Valve Chamber
*	00-4463-89	Nut, St. Steel, Brine Valve Chamber

\* Not Illustrated

± Recommended Spare Parts

## Brine System - Safety Valve

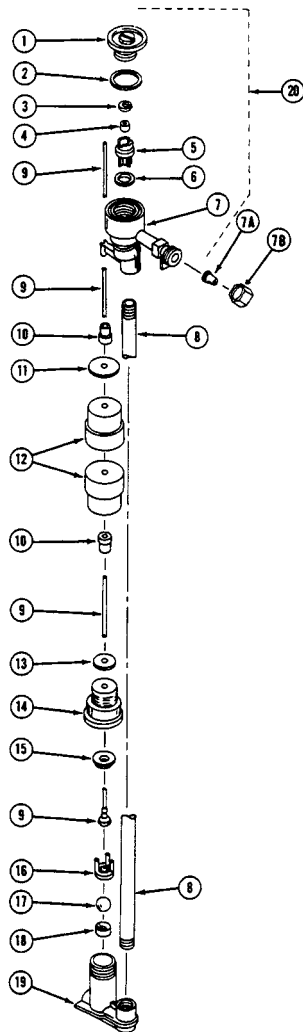


Item	Part No.	Description
<b>40-GALLON TANK (375 lbs. capacity)</b>		
	01-0019-09	Tank System Complete 40 gallon
1	00-3039-80	Cover, PP
2/3	00-3044-39	Plate, Salt, PE, w/Supports
4	00-4471-08	Tank, PE
5	00-4463-88	Screw, SS, #10-32 x 0.625"
6	00-3046-06	Cap
7	00-3042-93	Brine Safety Valve
8	00-3045-37	Brine Valve Chamber
*	00-9018-00	Tubing, Brine Line 1/2" O.D. x 3/8" I.D. Black, Plastic
*	00-4463-89	Nut, SS, #10-32
<b>75-GALLON TANK (600 lbs. capacity)</b>		
	01-0019-01	Tank System Complete 75 gallon
1	01-0019-29	Cover, PE
2	00-3044-74	Salt Plate Assembly
3	00-3317-69	Support Leg (6 Required)
4	00-3040-34	Tank, PE
5	00-3184-92	Screw, SS, #10-16 x 0.5"
6	00-3046-06	Cap
7	00-3042-93	Brine Safety Valve
8	00-3045-27	Brine Valve Chamber
9	00-3306-29	Spacer
*	00-9018-00	Tubing, Brine Line 1/2" O.D. x 3/8" I.D. Black, Plastic

\* Not Illustrated

† Specify number of feet

## Brine Valve - 12" and 14" Tanks



Item	Part Number	Description
	00-3042-93	Brine Valve Complete
1	00-3321-25	Cap, Refill
2	00-4415-93	Quad-Ring, Buna-N, 1.25" x 1.375"
5	00-3321-74	Restrictor, Refill, 0.8 gpm (12" & 14" Tanks)
6	00-3048-05	Gasket, Buna-N, 0.682" x 0.940"
7	00-5418-22	Body, Refill
7a	00-4405-16	Insert, PP, 0.5"
7b	00-4404-02	Nut, PP, 0.5"
8	00-2234-35	Pipe, Kral, 0.25" NPTE x 35"
9	00-3400-14	Steam Seat Assembly
10	P0-3047-03	Retainer, Float / MP 25
11	00-3323-49	Weight, Float
12	00-4448-73	Float
13	00-3320-72	Seal, Top
14	00-4446-64	Screen Cap
15	P0-4444-96	Stem Seat, EPT / MP 10
16	P0-4473-92	Insert, Black / MP 10
17	P0-4477-81	Ball Air Eliminator / MP 10
18	00-4035-66	Ball Seat, Buna-N
19	00-5418-21	Float Valve Body w/Seat
20	00-3321-74	Brine Refill Assembly
*	00-9018-00	Tubing, Brine Line 1/2" O.D. x 3/8" I.D., Black, Plastic

\* Not Illustrated. Specify number of feet